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BOMBAY BRANCH

OF THE

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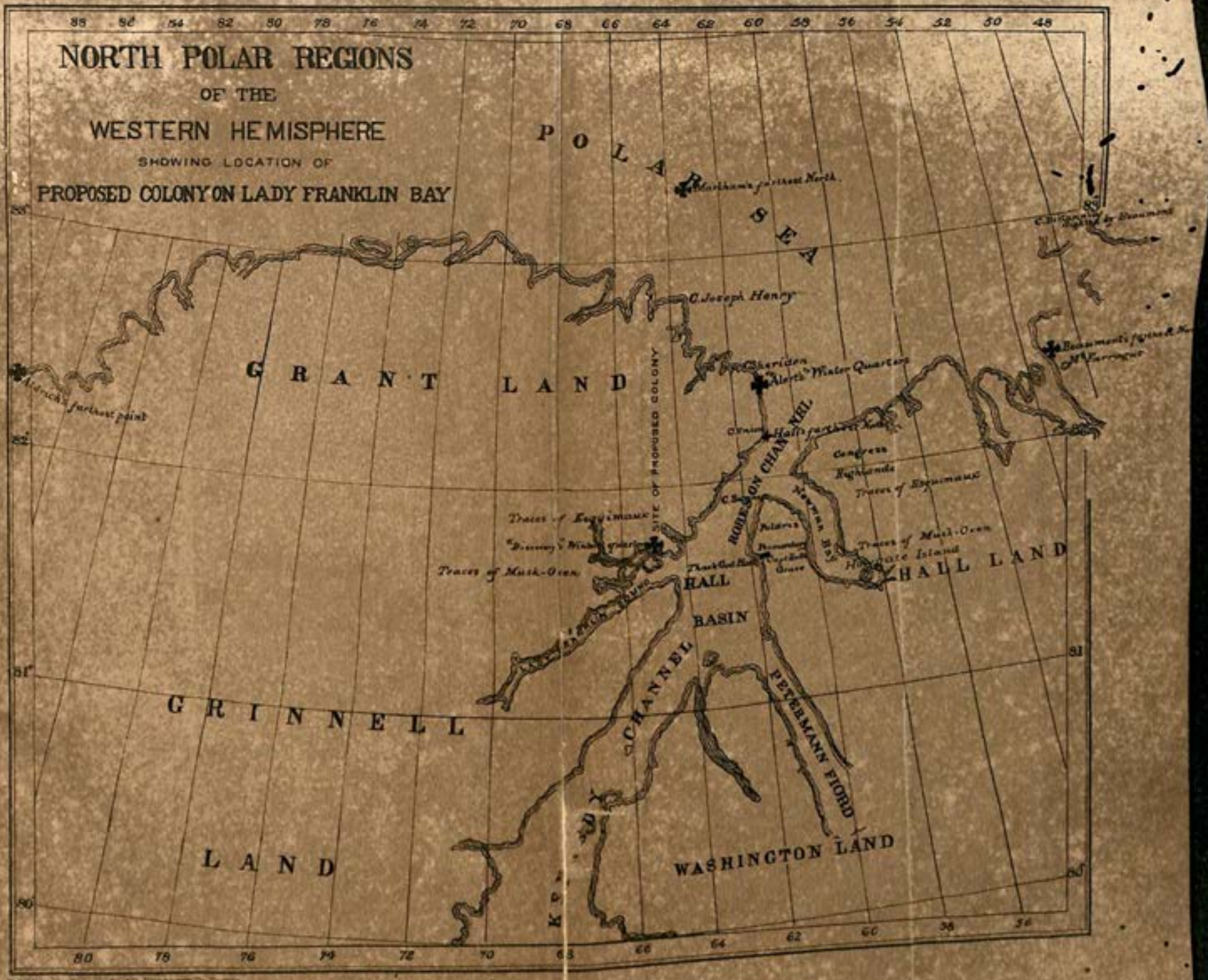
NORTH POLAR REGIONS
OF THE
WESTERN HEMISPHERE
SHOWING LOCATION OF
PROPOSED COLONY ON LADY FRANKLIN BAY
POLAR SEA
GRANT LAND
C. Joseph Henry
Alert
SITE OF PROPOSED COLONY
Traces of Esquimaux
Traces of Musk-Oxen
HALL BASIN
GRINNELL LAND
KENNEDY CHANNEL
PETERMANN FIORD
WASHINGTON LAND
HALL LAND
Traces of Musk-Oxen
Traces of Esquimaux
Congress Highlands
Norman Bay
Polaris Promontory
Repulse Harbour
Hall Basin
Hall Land
Grant Land
Grinnell Land
Washington Land

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POLAR COLONIZATION.

MEMORIAL TO CONGRESS

AND

Action of Scientific and Commercial

ASSOCIATIONS.

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PREFACE.

To the Honorable Senators and Members of the Forty-Fifth Congress this memoir is respectfully submitted, in the hope that its contents will convince them of the wisdom of supporting the plan for establishing a temporory Arctic colony which it sets forth, and in the hope that, under the direction of Divine Providence, it may prove of service in promoting and furthering the attainment of an object so worthy alike of national ambition and of national success.

HENRY W. HOWGATE.

INTRODUCTORY.

The history of Arctic exploration is one of the most thrilling interest, and its pages, whether turned by the hands of youth or of maturer years, enchain alike the faculties of thought and fancy with a weird fascination akin to that whereby the "ancient mariner" held the wedding guest a captive to his will. From the days of the gallant Frobisher, the first Englishman who sailed in search of the famous northwest passage, down to the later times of Ross and Parry, of the canonized Franklin and the unfortunate Hall, the icy barriers of the Pole have guarded, still unsolved, their mysterious riddle. The rolls of chivalry contain no names gilded by deeds of greater prowess, than the history of that strange region has given to an admiring world. Men of many diverse nations, impelled by motives as various as their nationalities, have penetrated these gloomy fastnesses.

The love of adventure which stimulated the hardy sons of Devon, was spurred to more earnest action by visions of Cathay, but the lust for gold which sought its highway in the northwest passage, has not alone inspired the breasts of those who made the oft-recurring journeys over this frozen road to honor.

The magnanimity of honorable governments that would not leave to unknown fates the gallant sons sent forth to conquer nature, and the undying love of a great lady for her missing lord have contributed more than all else to emblazon the pages of Arctic history with names whose lustre time can never dim. Nor has mankind alone been the explorer of these hidden regions. Ships manned by no human hands have sailed the ice bound seas. Steered by the helmsman Fate upon their unknown voyage through Boreal solitudes they have yet returned staunch, taut, and seaworthy; and although no human intelligence traced upon the log book any record of the cruise, still they have told to practical eyes truths which aided the unraveling of the primeval mystery.

The history of several abandoned whaling vessels, and more particularly of the *Resolute*, of her fifteen months' solitary cruise, and subsequent recovery, is too well known to need further mention here.

But the glamour of romance and the intense longing to grapple with and solve the mysteries of the unknown, strong though their influence may be upon the human mind, sink to utter insignificance when compared with the nobler aims which urge mankind toward the conquest of the Pole. Almost every department of science abounds with great problems whose solution will be found only behind the icy barriers of the North, and to a few of these the attention of the reader will be briefly directed.

GEOGRAPHY.

This science will derive most substantial benefits and additions from further Polar research. To ascertain whether the Polar sea contains important lands or islands scattered throughout it, and to settle finally the true configuration of Greenland, may be noted as two of the most important points to be decided.

HYDROGRAPHY AND METEOROLOGY.

Already in these two great branches of science, so important, not only to the needs of trade and commerce, but to our daily wants and existence, the United States are in advance of all the nations of the earth, and in no other region can we look for as important discoveries as those which will doubtless be made within the Polar basin. The question of ocean streams and currents, where the Gulf stream and Kurosiwo end and the Polar current commences, with the phenomena attending the diurnal rise and fall of the tides, the direction, changes, velocity and character of winds, and also many questions of temperature, can nowhere be studied with so fair a prospect of success as within this wondrous area.

GEODESY.

A series of observations upon the vibrations of a pendulum swinging in the immediate vicinity of the Pole can alone accurately determine the true configuration of the earth and settle definitely many disputed points connected with the laws of gravity. Upon these important subjects some of the most valuable information yet obtained has been gained from the careful and thorough experiments made under the direction of our own National Academy of Science by the scientific members of the *Polaris* expedition.

MAGNETISM, ASTRONOMY, &C.

Terrestrial magnetism and atmospheric electricity can be studied in these regions more satisfactorily and with better prospects of important discovery than in any other portion of the globe. In solar and stellar chemistry, numberless facts concerning the solar corona and the zodiacal and auroral lights await investigations which cannot be satisfactorily conducted, except in the vicinity of the Pole. The study of the spectrum of the sun, the aurora, and the Arctic twilight, will yield rich and increasing treasures of knowledge. The Arctic winter is a more pleasant season for such observations than is usually supposed. The long Polar night is said to be "more endurable and more enjoyable" with its corruscating splendors of the aurora borealis, than the same season further south, with its mist and fog. To quote Dr. Kane, "the intense beauty of the Arctic firmament can hardly be imagined; it looked close above our heads, with its stars magnified in glory, and the very planets twinkling so much as to baffle the observation of our astronomer."

MINERALOGY.

The Polar regions are rich in this department. Graphite and other useful minerals are abundant, while cryolite, the double fluoride of sodium and aluminum, which has been found so invaluable in the industrial arts of this country, is not known to exist in any other part of the world. Gold has also been found, and a colony remaining for several seasons would probably be able to determine the extent and value of the auriferous deposits.

GEOLOGY, ETHNOLOGY, ETC.

The geology of this frigid clime is especially worthy of close and extended study, while its flora and fauna are of the greatest interest to the naturalist. The Arctic regions are the richest of the world in fossil remains, and in the department of Ethnology suggests an inquiry of great interest and importance. In latitude 81° 30′, Captain Hall found traces of human beings, and if land should be found at the Pole, within the Polar sea, traces may be discovered of that race of Arctic Highlanders, anterior to the Esquimaux, of

whose former existence Sir John Ross obtained such indubitable proofs.*

It is impossible in a brief memoir to do more than glance, in the most hurried manner, at the principal triumphs to be won in the cause of science, in these far distant regions, while the absolute poverty of any summary, so attempted, can readily be imagined when it is remembered that the volume of scientific instruction and suggestion, prepared under the direction of the British Royal Society, for the guidance of Arctic explorers, contained nearly 800 pages.

From the year 860, when Naddodr, the Norwegian, sailed northwest toward the Arctic regions and discovered the island of Iceland, down to the departure of Captain Allen Young from England, in 1876, to communicate with the depots of the *Alert* and the *Discovery* under Captain Nares, there have been no less than two hundred Arctic voyages of which we possess authentic record. In the 9th century there was one, in the tenth, one, in the eleventh, twelfth, thirteenth, and fourteenth centuries, one each. Then they commence to increase very rapidly in numbers, for in the fifteenth century there were three, in the sixteenth, twenty-two, in the seventeenth, thirty-eight, and in the eighteenth, eleven; while from 1800 to 1850, there were thirty-seven, and from 1851 to 1876, no less than sixty-nine expeditions. It is only necessary here, however, to glance rapidly at five of the most recent Arctic voyages.

DE HAVEN'S EXPEDITION.

This expedition, comprising the *Advance* of 140, and the *Rescue* of 90 tons, was first in order of those which may be considered purely American, and was fitted out by the United States Government, but chiefly at the cost of Mr. Henry Grinnell, of New York City. It was organized for the purpose of exploration, and also of searching for the missing Sir John Franklin, being designed to co-operate with several English expeditions for the same object, which had started for, or were already cruising within the Arctic circle. The expedition, which sailed from New York on May 24th, 1850, was commanded throughout with distinguished ability and zeal, by Lieutenant E. J. De Haven, of

*There prevail, indeed, even now, among the Esquimaux, traditions of lands far north of their own, inhabited by a people superior to themselves in knowledge and intelligence; lands where long bearded men fatten the musk ox, and where churches and clocks are found.

the U. S. Navy, who was accompanied by Dr. Kane, the celebrated Eastern and Arctic explorer, in the capacity of surgeon and naturalist.

The plan of the expedition was to push forward, without delay, toward Bank's Land and Melville Island, and generally to make the best use of every opportunity for exploring in that direction. At this time there were within the Eastern Artic waters no less than eleven vessels belonging to various exploring expeditions. In the latter part of August, DeHaven visited Cape Riley and Beechy Island, about three miles west of the cape, just at the entrance of Wellington Channel, where traces of the Franklin party had been found, and wintered in the vicinity of ships of the other expeditions. The spring of 1851 was devoted to land explorations, in which the shores of Wellington Channel, the coast of Bank's Land, and the waters leading from Barrow's Strait to Melville Island, were thoroughly explored. DeHaven, with his compeers, discovered 675 miles of hitherto unknown coast, and to him and his expedition belongs exclusively the honor of discovering Grinnell Land, to the north and west of Smith's Sound and Kennedy Channel. Finally, the expedition, which had gallantly led the way wherever they could go, and whose commander earned for himself at the hands of the English the sobriquet of "the mad Yankee," after enduring much suffering and danger, arrived in New York, the *Advance* on September 30, and the *Rescue* on October 3, 1851, having been absent a little over sixteen months, and having wintered within the Arctic seas. It is worthy of notice here that Lieutenant DeHaven invariably found that the water of the Polar seas preserved beneath the ice a temperature of 28° Fahrenheit, or 4° below the melting point of fresh water ice.

DR. KANE'S EXPEDITION.

This expedition was another of those sent out in search of Sir John Franklin. It was fitted out at the expense of the United States, Mr. Grinnell and Mr. George Peabody; sailed from New York May 30, 1853, and followed the Smith Sound route. Kane wintered in 1853–54 in Rensselaer Bay, on the western coast of Greenland in latitude 78° 37′ north. Leaving his ship, the *Advance*, he made a boat journey to Upernavik, 6° further south, and next traced Kennedy Channel, the northerly prolongation of Smith's Sound, to latitude 81° 22′ north, and sighted the highest northerly

land which had been seen up to that time. Hayes, who accompanied him, reached a still higher latitude in dog-sledges. Members of the expedition reported an open sea to the north of Kennedy Channel with tides which ebbed and flowed, and these tides must have come from the Atlantic ocean, most probably by and through the North Atlantic Channel. Members of this expedition, during its stay in these regions, penetrated as far as latitude 80° 35′, a point named by them Cape Constitution, in Washington Land. On May 17, 1855, they abandoned the *Advance* and on the 9th of August, after a journey of eighty-four days in boats and sledges, attended by many narrow escapes and much privation they reached Upernavik, where they were found by Captain Hartstene, commanding the *Release* and steamer *Arctic*, an expedition which had been fitted out by the United States to find and rescue them. Dr. Kane attained most important scientific results, among which may be mentioned the following:

1. The discovery of a large channel to the northwest, free of ice, and leading into an open and expanding area, equally free.

2. The discovery and delineation of a large tract of land, forming the extension northward of the American continent.

3. The completion of the circuit of the straits and bay heretofore known at their southernmost opening of Smith's Sound.

The expedition finally reached New York in October, 1855, having spent two winters in the Polar regions. A remarkable feature of this expedition was that the existence of the open Polar Sea which it discovered, had been already maintained by Dr. Kane, in a paper read before the American Geographical Society, October 14, 1852. Well deserved honors were showered upon the lion hearted explorer. Gold medals were awarded to him by Congress, by the Legislature of New York, and by the Royal Geographical Society of London. He also received the Queen's medal given to Arctic explorers between the years 1818 and 1856, and a testimonial from the British residents of New York city.

HAYES' EXPEDITION.

Dr. Isaac I. Hayes, a firm believer in the theory of the open Polar Sea, who accompanied the enterprise just referred to, succeeded with the aid of private subscriptions in organ-

izing, and fitting out another Arctic exploring expedition. With a company of only fourteen men he left Boston July 6, 1860, in the schooner *United States* for Proven and Upernavik, in Greenland, arriving on the 12th of August, at the latter place, where he took on board three Danes, three Esquimaux and a number of dogs for sledge work. Hayes entered Baffin's Bay about the 20th of August, but was so delayed by ice that although he had designed reaching some point between latitude 79° and 80°, the schooner was frozen in at Port Foulke, a point about latitude 78°. Several sledge journeys were made during the winter months, but were somewhat barren of results until April 3, when with several sledges drawn by dogs, a lifeboat upon another sledge drawn by men, and twelve of his crew, he started across Smith's Sound to Grinnell Land to explore its coast line. After encountering great danger and difficulty, sending back nearly all the party, several sledges and the lifeboat, which could not be carried further, Hayes with three men reached Cape Hawks, Grinnell Land, on May the 11th. Turning northwards, they explored the coast for several days, but the men were exhausted, and Hayes was obliged to leave two of them on the way. With Knorr, his remaining companion, Dr. Hayes reached latitude 81° 35′ on May 18, 1861, further advance being forbidden by the rotten ice and cracks. Having no boat the explorer retraced his steps, and taking up in detail the men he had dropped out *en route*, he reached the schooner in the beginning of June, after a toilsome journey, when, finding that she was so much damaged as to render further extended exploration impossible, he returned to Boston in October, 1861, fully determined to make another effort, which, however, the civil war prevented him from undertaking.

CAPTAIN HALL.

This expedition, the last sent out from American shores, and the one, which in spite of its unfortunate conclusion, did more towards the solution of the points in question and the advancement of scientific knowledge than any of its predecessors, left St. Johns, Newfoundland, July 19, 1871, sailed up Smith's Sound, and reached the 80th parallel about the end of August. Thence it proceeded up Kennedy Channel, and penetrated its northern prolongation, some thirteen miles wide, known as Robeson's Channel. This passage was followed to 82° 16′ north latitude, being the highest point up to that time

attained by any ship. From this point the expedition returned to winter in Thank God Harbor, a point on Robeson Channel latitude 81° 38′. During the early autumn of the same year, Captain Hall made a sledge journey northwards, reaching latitude 82° 3′, and returning from this journey was taken ill and died, November 8, 1871, when Captain Buddington, the former sailing master, succeeded to the command. The *Polaris* left her winter quarters in August, 1872, and on October 15, 1872, while the vessel was fast in the ice about latitude 78° 20′ and leaking badly, a part of the crew, while landing provisions, were separated from her by the breaking up of the ice floe, and drifted rapidly southward. On April 30, 1873, they were picked up by the ship *Tigress*, in latitude 53° 35′ north. The remainder of the crew who were left on the *Polaris* were rescued June 23, 1873, by the Scotch steamer *Ravenscraig*, about latitude 75° 38′.

CAPTAIN NARES.

It may not be out of place here to give a brief outline of the last expedition which has returned from the Polar basin, and thus bring down to the present date the records of Arctic research, more especially as the route which it took was that followed by Kane, Hayes and Hall. The *Alert* and *Discovery*, under Captains Nares and Stephenson, sailed from England in May, 1875, and left Upernavik in Greenland July 22d of the same year. Passing through Smith's Sound and Kennedy Channel, the *Discovery* wintered in latitude 81° 44′, but the *Alert* struggled on through Robeson Channel, rounded the northeast point of Grantland, and found not, as was anticipated, a continuous coast line, but a vast ice bound sea. Finding no harbor, the ship was secured inside a barrier of ice in latitude 82° 31′, the most northerly wintering place ever yet occupied by man. The winter which followed was the severest on record. For 142 days the sun was never seen, and the mercury was frozen during a period of nearly nine weeks. Upon one occasion the thermometer showed 104° below the freezing point, and during two fearful weeks the mean temperature was 91° below the freezing point. As soon as the sun reappeared sledge exploration began. One party went east, exploring the northern shore of Greenland, and the other explored westward on the shores of Grantland. Captain Stephenson, of the *Discovery*, crossed Robeson Channel to Polaris Bay and erected over the grave of Captain Hall a tablet with a suit-

able inscription, which had been brought out from England for the purpose. The shores of Grantland were traced to longitude 85° 33′, while those of Greenland were explored as far east as (west) longitude 50° 40′. Lastly, a party commanded by Commander Markham pushed northward, and after unheard of difficulties, on May 12, 1856, they planted the British flag in latitude 83° 20′ 26″, which is believed to be the most northern point ever reached by civilized man. After accomplishing these results the expedition returned to Great Britain, arriving at Valencia, Ireland, October 27, 1876.

CAUSES OF FAILURE.

From this rapid survey of the more recent expeditions it will be seen that though Dr. Hayes, with only limited means at his command, and a small number of men made as high a latitude as 81° 35′ in 1861, Captain Hall went only thirty-six nautical miles beyond him; while Captain Nares, with two vessels and over a hundred men, fitted out at a cost of a million of dollars, went only some seventy nautical miles beyond Captain Hall's furtherest northern point. The records of Arctic exploration afford to the careful reader many details of great and exceeding interest, and none of these are more instructive than those which point the causes leading to the failure of so many expeditions planned with so much prudence and foresight, so thoroughly organized and so bravely led. Prominent amongst these causes may be named the following:

First. The expeditions were frequently sent out in the severest seasons, and at times when meteorological science, now so closely studied, was either in its infancy or entirely unknown, and could not be used to forecast the possibilities of closed or open seasons.

Second. Much valuable time—often the precious period during which alone the way was open and the temperature favorable—was lost by the explorers in making the voyage to the scene of their operations, which they reached, in many instances, only to find exploration impossible, and to be enclosed for whole seasons in the relentless ice, advance or retreat being alike impossible.

Third. The hardships of this voyage out, with its delays, too often so tried the men, and sapped their strength that upon arriving in the arctic Basin they were unfitted for the work of exploration.

Fourth. The neglect or insufficient use of lime juice and other anti-scorbutics.

Fifth. The lack of proper discipline, which, in expeditions of this kind should be of the most thorough and perfect character.

Sixth. The failure to employ the Esquimaux as guides, hunters and assistants, and their invaluable dogs for draft purposes in the sledges.

Seventh. The imperfect means of communication—such, for instance, as signaling or telegraphing—between separated members or parties of the same expedition; and,

Eighth, and most important of all, a cause, fruitful of disaster, which has sown in so many undertakings of the kind the seeds of dissension and of utter failure, dependence on their vessels. Having their ships always within reach in case of need as "cities of refuge," and having, save them, no fixed habitation, rendezvous, or base of operation; even with their ships at hand they were timid, unadventurous and irresolute, while without them they were helpless and despairing.

And this brings us to the plan which I had the honor to present to the Forty-fourth Congress, in the paper herewith subjoined; a plan by which it is hoped to redeem the errors of the past through the knowledge of the present, and the achievement of the near future. The days of spasmodic and unsupported expeditions have passed away, and a new era has opened with an effort to commence a direct and steady advance towards the Pole, each forward step being used as a coign of vantage from which to plan and plant its successor.

THE COLONIZATION PLAN.

PRELIMINARY.

The expedition of Captain Hall in the *Polaris*, in 1871, and of Captain Nares in the *Alert* and *Discovery*, in 1875, have shown that by the use of steam it is a comparatively easy matter to reach the entrance to Robeson's Channel in latitude 81° north, and that the serious difficulties to be overcome in reaching the Pole lie beyond that point. Parties from the two expeditions have made fair surveys 140 miles north of this, leaving only about 400 miles of unexplored re-

gions between that and the goal of modern geographers—the Pole.

When Captain Hall reached the upper extremity of Robeson's Channel the lookout of the *Polaris* reported open water in sight and just beyond the pack which surrounded the vessel and prevented further progress. This open water was afterwards seen from the cape at the northern opening of Newman's Bay, and it was the opinion of the crew of that ill-fated vessel that if she had been but the fraction of an hour earlier in reaching the channel they could have steamed unobstructed over a veritable "open sea" to the Pole itself. We know that they did not succeed, but were forced to winter almost within sight of this sea, and subsequently, disheartened by the loss of their gallant commander, abandoned the enterprise.

Where this open water was found Captain Nares, in 1875 and 1876, found solid, impenetrable ice, through which no vessel could force its way, and over which it was equally impossible for sledge parties to work to advantage.

These facts appear to show that within the Arctic circle the seasons vary as markedly as in more temperate southern latitudes, and that the icy barriers to the Pole are sometimes broken up by favoring winds and temperature. To reach the Pole prompt advantage must be taken of such favorable circumstances, and to do this with the greatest certainty and with the least expenditure of time, money, and human life, it is essential that the exploring party be on the ground at the very time the ice gives way and opens the gateway to the long sought prize. This can only be done by colonizing a few hardy, resolute, and experienced men at some point near the borders of the Polar Sea, and the most favorable one for the purpose appears to be that where the *Discovery* wintered in 1875–76.

THE COLONY.

Such a party should consist of at least fifty men, and should be provided with provisions and other necessary supplies for three years, at the end of which period they should be visited, and if still unsuccessful in accomplishing the object, revictualed and again left to their work. Captain Hall spent eight years among the Esquimaux, and each year found himself better fitted to withstand the severity of the Arctic circle, and the party of which I speak would in like manner become acclimated, and eventually succeed in ac-

complishing the long-sought end. With a strong, substantial building, such as could easily be carried on shipboard, the party could be made as comfortable and as safe from atmospheric dangers as are the men of the signal service stationed on the summits of Pike's Peak and Mount Washington, or the employés of the Hudson's Bay Company stationed at Fort York, where a temperature of minus 60 degrees is not uncommon. A good supply of medicine, a skillful surgeon, and such fresh provision as could be found by hunting parties would enable them to keep off scurvy, and to maintain as good a sanitary condition as the inhabitants of Godhaven, in Greenland. Game was found in fair quantities by the *Polaris* party on the Greenland coast, and by those from the *Alert* and *Discovery* on the mainland to the west, especially in the vicinity of the last-named vessel, where fifty-four musk oxen were killed during the season, with quantities of other and smaller game. A seam of good coal was also found by the *Discovery's* party, which would render the question of fuel a light one, and thus remove one of the greatest difficulties hitherto found by Arctic voyagers.

The proposed location of the principal depot or post is upon Lady Franklin Bay between latitude 81° and 82°, and there is no question that this can be reached with a steam vessel, as Captain Hall went as high as Cape Union, between latitude 82° and 83° with the *Polaris*, and Captain Nares still higher with the *Alert*. It is probable that this higher point may be reached with the vessel, in which case coal and provisions could be deposited there to form a secondary base of operations for the exploring party. If this can be done, the road to the Pole will be shortened by about ninety miles in distance and three weeks or more in time, two very important items. It should be clearly understood, that the only use to be made of the vessel is the transportation of the men and supplies to the location of the colony. When this is done the vessel will return to the United States and await further instructions. An annual visit might be made to the colony, to carry fresh food and supplies, to keep its members informed of events occurring in the outside world, and bear them news and letters from anxious relatives, to bring back news of progress made and of a private character to friends; also, if necessary, to bring back invalided members of the expedition, and carry out fresh colonists to take their places. This annual visit, however, is not absolutely necessary, for if the return trip is deferred until the

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DISCOVERY BAY, SUMMER,

SITE OF THE PROPOSED POLAR COLONY.

third year, it is probable that the work of the colony will be found completed, and it can be permanently abandoned. The vessel should, of course, take out a sufficient quantity of supplies to enable the colony to remain longer than three years if necessary. It is hoped that Congress will authorize the employment of detailed officers and men to form the majority of the colony, as this plan will best secure that military discipline, without which the failure of former expeditions will undoubtedly find a new parallel in this. The permanent colony should consist of fifty selected men, mustered into the service of the United States, three commissioned officers, and two surgeons; all to be selected with a view to their especial fitness for the work, young, able-bodied, resolute men, who can be depended upon to carry out instructions to the extreme limit of human endurance. An astronomer and two or more naturalists, to be selected by the National Academy of Sciences, and to work under instructions from that body, subject to such general supervision and direction from the head of the expedition, as is customary at all posts in charge of an officer of the United States, should accompany the expedition. One or more members of the regular force should be competent to make meteorological observations, and to communicate by telegraph and signals whenever such communication becomes necessary.

ESQUIMAUX AND DOGS.

To the expeditionary corps brought from the United States should be added a number of Esquimaux to serve as hunters, guides, &c., who can be taken over with their families from Disco or Upernavik, in Greenland, and also an ample number of the Esquimaux dogs, so indispensable for sledging, and so useful as food when their capacity for work is gone.

ANTI-SCORBUTICS.

The outfit of the *Polaris* expedition offers a safe guide in this respect, and one which, if followed, will afford proper safeguards against scurvy. Lime juice has been used too often and has proved too absolute an antidote for its virtues to be called in question now.

THE COLONY

should be kept under the strictest discipline, and to this end should be formally enrolled in the military service, save

perhaps the strictly scientific members. By discipline only can such control be exercised as will be indispensable to the successful ending of the search.

One cannot read without pain the account of the *Polaris'* expedition, where the bonds of discipline, only too loose before Hall's untimely death, were entirely relaxed after it. The first in command of the new expedition should be a man able not only to gauge men, but to control them, and his second should be like unto him. Enthusiasm and energy are especially desirable, but coolness of temper, firmness of rule, persistency of purpose, and a well balanced mind, fertile in resources and expedients, are indispensable to success.

The outfit of the expedition should include some two hundred miles or more of copper wire, to connect the colony at Lady Franklin Bay with the subsidiary depot at Cape Union, and thence northward as far as practicable. Copper wire is strong, light, flexible, and a good conductor, and can be worked while lying upon the dry snow or ice without support. The necessary battery material, and instruments, including telephones, should be taken to equip the amount of line, and the battery could be kept permanently at the Bay station, where, fuel being abundant, it could be kept from freezing. A few sets of signal equipments, such as are used in the army signal service, would also form an indispensable part of the outfit, and all of the men should be instructed in their use and in the signal code. Thus provided with means of communication the sledging parties could move forward with confidence, as they would be able, when necessary, to call upon their comrades who remained behind for advice or assistance. Open water will, it is believed, be found in any ordinary season before the party gets as far north as 83° 20′ 26″, the turning point of Lieutenant Markham's sledge party, and that boats can thence be used to the land which it is still believed will be found about latitude 85°, in accordance with Captain Hall's theory based upon the native traditions. The existence of coal at the *Discovery's* winter quarters settles the question of colonization and the location of the colony as a means of Polar exploration; and the Nares expedition would have been a success if it had done nothing more than discover this supply of fuel. The failure of Captain Nares' admirably equipped expedition to reach the Pole is in a great measure attributable to the abnormally cold season and the exceptional character of the winds, which had

resulted in the formation of ice ridges running across the line of march, thus making progress difficult, slow, and dangerous. It is reasonable to suppose from past meteorological records that these unusual conditions will not occur again for several years. Instead of discouraging further effort, the failure of Captain Nares' expedition from the causes named should stimulate fresh endeavors, and hold out a fair prospect of success. At any rate, the little colony on Lady Franklin Bay during their three years' residence, besides having the opportunity of *selecting* an open season, and becoming thoroughly hardened and acclimated, would have their work narrowed down to a common focus—the pathway due north. The work of the Nares expedition clears the way for a direct movement upon the Pole. The explorations westward along the coast by Lieutenant Aldrich, and eastward by Lieutenant Beaumont, obviate the necessity for similar work now within the limits of their surveys. Upon landing and unloading the stores and provisions quarters should be erected, and the vessel, returning to the United States, would leave behind her a thoroughly equipped, self supporting, and self reliant colony which would push, ever northward, the limits of discovery.

SLEDGE JOURNEYS.

The attempt to draw the loaded sledges by means of mere manual labor should not be made unless it should become in any particular instance a matter of absolute necessity, as it is sure to result disastrously, and seems to have been one of the causes of failure of the Nares expedition. The expedition from the colony to the Pole may consist of eight sledges, with six men to each sledge, the distance to be traveled, some 400 miles, being divided into eight stages of fifty miles each. At the end of the first stage one sledge could be sent back. A portion of the provisions which it originally carried would have been consumed, and the rest would be deposited in a *cache* in the ice secure from Arctic animals. At the end of the second stage the second sledge would be sent back; at the close of the third stage the third sledge would take up its homeward journey, and, following out this plan, only a single sledge would remain. The returning sledges being but lightly freighted, and traveling, moreover, a route already pioneered, several of their hands could be retained so as to man the eighth sledge with ten or more explorers. This last sledge with its full

complement would perform the most important work of all. It would press forward, reach the Pole, make the necessary observations and then return. Upon its homeward journey it would follow the route already made in the forward journey, and would find provisions at each successive *cache*. This portion of the plan would be useful in a closed season, but in an open one the journey would have to be made either wholly in boats or partly in these and partly by sledges.

ADVANTAGES OF THE SMITH'S SOUND ROUTE.

This route is preferable to that by Spitzbergen, where the ice drift is much greater and where the all important vein of coal does not exist. Moreover, two recent expeditions, those of Hall and Nares, have shown that the whole length of the Sound is practicable for steaming up as far as Discovery Harbor, on Lady Franklin Bay, if not beyond, in any ordinarily open season. But it is not doubted that during its three years' sojourn the colony may experience and take advantage of such a season as will carry an expedition much farther, and perhaps even the whole distance to the Pole. There is a *warm* current setting steadily northward from the Pacific Ocean through Behring's Straits, which constitutes the mighty ocean river of the Kurosiwo. This current must have an outlet, which is possibly found in the southerly drift of the Atlantic side.

During the summer there are probably long lanes of water free of ice from the upper end of Smith's Sound, and following these, against the downward flowing current, a pathway will surely be found, practicable for boats, during some favoring season. Such favoring season and such a practicable pathway can only be found by men colonized as proposed at a point where, without the fatigue of a long and perilous voyage, healthy, vigorous, and thoroughly acclimated, they will be ready and eager to sieze the proffered opportunity. Failing such an opportunity, a chance barely possible, the alternative of sledge journeys still remains, and sledge journeys undertaken under better and more favorable auspices than any which have as yet been attempted.

THE HEALTH AND PROSPECTS OF A COLONY.

The severity of the climate on Lady Franklin Bay and in the neighboring regions has been much exaggerated. To

parties under cover it is not more trying than that at the summits of Mount Washington, in New Hampshire, or of Pike's Peak, in Colorado, as stated by a former member of one of Dr. Hayes' expeditions, who has since served a year upon the summit of the last named mountain. The report on the *Polaris* expedition shows that during the summer all the low lands and elevations at Thank God Harbor (opposite Discovery Harbor on Lady Franklin Bay) were bare of snow and ice, excepting patches here and there in the shade of the rocks. The soil at that period was covered with a vegetation of moss interspersed with small plants and willows. Seals were abundant in the water, as were also jelly-fish and shrimps. Captain Hall's last dispatch, dated from his encampment on the north of Newman's Bay, nearly a whole degree further north than the site of the proposed colony, says: "We find this a much warmer country than we expected. We found the mountains on either side of Kennedy Channel and Robeson Strait entirely bare of snow and ice with the exception of one glacier that we saw. The country abounds with life, and seals, game, ducks, musk cattle, rabbits, wolves, foxes, bears, partridges, &c. Our sealers have shot two seals in the open water while at this encampment."

Again, there are several towns in Northern Asia inside the Arctic circle, and a flourishing city of Russia (Archangel) is not far from it. At Yakutsk, on the river Lena, the ground is frozen solid all the year round, and only thaws a few inches in depth during the hottest summer. The thermometer often falls to 63° or 70° *minus*, and every winter there are periods of two or three weeks during which it does not rise above 60° *minus* upon Farenheit's scale. Yet this is a town possessing a population of 4,000 hardy, prosperous and contented human beings.

HOME SICKNESS.

The members of former expeditions, when they sailed from the hospitable shores of Christendom, severed every link that bound them to their homes and to civilization. In all the frozen realm they entered there was no place of refuge or of succor; nor could there be even a witness of their fate should failure attend them in their desperate lonely struggle with the giant forces of nature. With proud yet foreboding hearts, they passed into very shadows of death.

Nostalgia, that dreaded foe of isolated men, found in them

an easy prey through the long, sunless, Arctic winter, and drove some to mutiny and others to suicide, while when the hour of deadly peril came—the supreme moment of despair—the stoutest of heart was appalled by the knowledge that succor, if sent at all, must be guided by the merest chance, and that the rude cairn which covered his last resting place or his frozen effigy upon some drifting ice-floe might never meet the gaze of human eye. The new enterprise will go forth under far different auspices to seek a definite rendezvous from which every forward step will be duly chronicled; and the members of the expedition, well knowing that communication will be kept up for their aid, comfort and supply, will strive with a keener endeavor for the long coveted prize.

But changing seasons with their varying temperatures bring with them varying conditions of existence. There is a brighter side to the picture, and Dr. Hayes gives encouraging views upon this point, urging the general cheerfulness of Arctic crews, which is such a great stimulant to health and to success. Speaking of his expedition in 1861, he says that the crew were always, and had been, in perfect health; that he was his own ship's doctor, and a doctor without a patient, and that, "believing in Democritus rather than Heraclitus, they had laughed the scurvy and all other sources of ill health to shame." Nor is the danger of Arctic exploration so great as it, at first thought, appears to be. A distinguished naval officer who has served in those regions states that, "of all the seas visited by men-of-war the Arctic have proved the most healthy;" and Mr. Posthumus states, further, that, since 1841, England and America have sent out thirty-two expeditions, the total number of deaths from which has been only 38 men, or 1.7 per cent., a percentage which would appear much more favorable if the expeditions of the Germans, Swedes and Norwegians were included.

FACTS FROM FORMER EXPEDITIONS, AND VIEWS OF SCIENTISTS AND EXPLORERS, WHICH SHOW THE PLAN TO BE A FEASIBLE ONE.

The expedition of Captain Nares, while a failure in certain respects, has done a vast service for future explorers in clearly defining the difficulties to be met and overcome.

Captain Nares, who certainly does not underrate the difficulties, states that Lady Franklin Bay, latitude 81° 45′, can

probably be reached every year if the attempt is made in the right season.

There it is proposed that the colony shall be established and left for three years. Its high latitude, the facilities for reaching it, and the seam of coal found by the *Discovery*, render it, undoubtedly, the best wintering place in Robeson's Channel. The party having three years to remain, and no means of retreat open, has every inducement to devote its time and energy to the accomplishment of its purpose. From Cape Joseph Henry to the Pole is about 430 miles, which in a favorable season could be passed over in ninety days, going and returning.

In 1853 Captain McClintock made a sledge trip of 1,200 miles in 106 days, and Lieutenant Mecham one of over 1,000 in ninety-three days. In 1821 a trip of 800 miles was made by Wrangell in thirty-six days. The character of the ice passed over by him accords, in his description, with that found by Commander Markham. It is true that Commander Markham's party only averaged one and a fourth miles daily, but several causes operated against more rapid progress.

First. The want of dogs. The failure to take them seems a great error, for when their capacity for work is gone they can be used for food.

Second. The pack ice was exceedingly rough, and the drifted snow lay in such directions as to seriously impede their progress. The snow lay in its particular direction from a continued west wind, which does not prevail every year.

The evidence of Arctic travelers all shows that the surface of the ice materially changes from year to year, being some years quite smooth. The statements of Lieutenant Payer, the commander of the Austro-Hungarian expedition, 1872–74, are especially important in this respect, he giving an account of the change from smooth, regular fields of ice to rough, huge, disjointed packs.

Third. The party leaving land in Robeson's Channel presumably experienced some drift south until they had cleared the 83d parallel, when the tendency is divided between drifting east or south. The tide and current observations in Robeson's Channel showed continued strong southerly currents. The experience of Parry, who traveled weeks on pack ice before he discovered the general movement, shows how imperceptible the drift is. The statement that

Commander Markham's party traveled 276 miles to go seventy-three miles from the ship and but 245 to return corroborates this opinion. The party was thirty-nine days going, and, although sick, but thirty-three days returning. Directly north of Cape Joseph Henry the drift must become feebler as a party goes north, for Robeson's Channel being too small to relieve the Polar basin of all its ice, the greater part of it drifts eastward, so as to escape by the east coast of Greenland. Any drift apart from the locality near the mouth of Robeson's Channel would hardly increase one's distance from the Pole.

Fourth. The party was poorly provided with lime juice or other anti-scorbutics, and incipient scurvy impaired the strength of the party shortly after starting.

It is exceedingly probable that Commander Markham's party, when compelled by scurvy to turn back, was very near to land. The water had, we are told, shallowed to seventy fathoms.

Dr. Petermann, who probably has examined with the closest attention the records of all Polar expeditions, is firmly of the opinion that land will be found directly north of Cape Joseph Henry, in about latitude 87° That land was not seen by Markham's party in no wise militates against this theory, as the nature of the ice was such as to preclude a view of even eight or ten miles, and low land, such as usually prevails in the Arctic regions, can for the greater part of the year only be distinguished from pack ice by being traveled over. Should land be found within one hundred and fifty miles of Cape Joseph Henry a sub-station could be stocked with provisions, and success thus rendered a certainty. Should the sea open, the crossing of it would be a matter of only a few days. That it does open for a considerable distance Captain Nares admits in his report as definitely settled. The undoubted evidence of Kane, Hayes, Meyer, and Payer, is conclusive on this point. The latter, at Cape Fligely, latitude 82° 5′, in 1874, found a sea open as far as eye could reach. An English writer commenting on this account ingenuously remarks that Payer was too scientific, too cool, and possessed of too good judgment to term it an open sea, but called it a "polynia," or water hole. It matters little what it is named so long as it affords a safe, open road for a considerable distance toward the Pole. Dr. Petermann, the great geographer, believes such to be the case, and does not doubt that had Captain Nares remained another year he would have reached the Pole.

Ferrel, the great mathematical physicist, states that the physical condition of the globe forbids our believing in a solid frozen sea, but that the ocean currents maintain an open sea of greater or less extent. This opinion is borne out by the tidal and current observation made in Smith's Sound and Robeson's Channel and by the authorities quoted above, and also by the fact that, in June, 1872, the *Polaris* found open water to nearly 83°, while Payer, in the *Tegetthoff*, was fast in the ice at 76°, near Nova Zembla, and, lastly, in 1837, the *True Love*, of Hull, England, sailed north of Nova Zembla to latitude 82° 30′, and saw an open sea as far as eye could reach.

A SUMMARY.

To sum up, then, in brief: It is proposed to ascend a well known and practicable channel to an equally well known point where exploring parties have previously wintered, and there to form a colony. From the post so formed no time will be spent in needless quests along the shore either east or west, as surveys there have already been completed; but starting afresh from the closing point of former expeditions, and profiting alike by their discoveries, and mishaps, it is proposed to await the favorable opportunity born of the various seasons, and follow it up to an assured success.

CONGRESSIONAL ACTION.

The first formal action taken in Congress with a view to the adoption of the plan above sketched, was the introduction of the following bill, which was offered in the House of Representatives on January 8, 1877, by Hon. Morton C. Hunter, of Indiana:

A bill to authorize and equip an expedition to the Arctic seas.

"*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That the President of the United States be authorized to organize and send out one or more expeditions toward the north pole, and to establish a temporary colony, for purposes of exploration, at some point north of the eighty-first degree of north latitude, on or near the shore of Lady Franklin Bay; to detail such officers or other persons of the public service to take part in the same as may be necessary, and to use any public vessel that may be suitable for the purpose; the

scientific operations of the expedition to be prosecuted in accordance with the advice of the National Academy of Science; and that the sum of fifty thousand dollars, or such part thereof as may be necessary, be hereby appropriated out of any moneys in the Treasury not otherwise appropriated, to be expended under the direction of the President: *Provided*, that no part of the sum so appropriated shall be carried to the surplus fund or covered into the Treasury until the purpose of the appropriation shall have been completed, but may be applied to expenses of said expedition incurred during any subsequent year that said expedition may be engaged in its duties."

After a second reading the bill was referred to the Committee on Naval Affairs and ordered to be printed. On February 9, 1877, it was introduced in the Senate by Hon. Henry L. Dawes, of Massachusetts, read twice and referred to the Committe on Naval Affairs. On February 22, of the same year, it was reported favorably from the House Committee on Naval Affairs by Hon. Benjamin A. Willis, and recommitted. No further action was taken on the bill by the 44th Congress, but soon after the meeting of the 45th Congress it was again introduced in both houses by the same members and in each referred to the Naval Committee. On the 22d of January, 1878, Mr. Willis, on behalf of the Naval Committee of the House, submitted the following favorable report:

[To accompany bill H. R. 447.]

The Committee on Naval Affairs to whom was referred the bill (H. R. 447) to authorize and equip an expedition to the Arctic seas, submit the following as their report:

"That the object of the bill, 'to authorize the President to fit out an expedition to the north pole, and to establish a temporary colony for purposes of exploration,' is so interesting and important in its character that they have, while not neglecting to gravely consider it with reference to its results both to science and commerce, availed themselves of all information accessible, and called in requisition the testimony and experience of men pre-eminent in scientific experience and learning, whose communications are hereto appended and made a part of this report.

"The first inquiry pursued was whether, within the purview of the Constitution or otherwise, to fit out an exploration such as the bill proposes was an appropriate, legitimate func-

tion of the Government, for the exercise of which taxes could be properly levied upon the people; and, if so, whether the nation would get value received for the expenditure incurred and the perils to which its citizens would be exposed.

"In reaching a determination, the fact has not been considered that there are numerous precedents in our history precisely covering the present case, to wit: the joint resolution authorizing the acceptance of Mr. Grinnell's vessels, approved May 2, 1850; the resolution respecting the Kane expedition, approved February 8, 1855; the Hall (*Polaris*) expedition, (see legislative, executive, and judicial bill, approved July 12, 1870; the Wilkes exploring expedition, approved May 14, 1836, (see naval appropriation bill of that year.)

"The action of the Government in the foregoing instances indicates the views of previous Congresses respecting such a measure, as all such expeditions have been conducted under the auspices of the National Government. Nor has any importance been attached to the action of other governments, who not only heretofore have inaugurated such enterprises, but are contemplating the inauguration of others on a magnificent scale.

"We have ascertained, to our satisfaction, that the results yielded by prior explorations in the Polar seas, have incalculably benefited the whole world; that the knowledge acquired by experiment and discovery in that region can be obtained in no other way and in no other section of the globe; that such knowledge is an important factor in the regulation of commerce, which is absolutely dependent, so far as decreasing the perils of the deep and enlarging the boundaries of navigation are concerned, upon the knowledge of physical laws.

"The Constitution gives Congress power, in section 8 of article 1, 'To regulate commerce with foreign nations.'

"And also in the same section and article, 'To make all laws which shall be necessary and proper for carrying into execution the foregoing powers.'

"So the question as to the power of the Government is without the domain of doubt or discussion.

"The Government has the constitutional power. Is it proper to exercise it?

"Whatever benefits are harvested favor no special interest or class. The added knowledge obtained is the property of mankind.

"Give a subsidy, you enrich a corporation by extorting from the body-politic. Impose a duty for the purpose of protecting a particular industry, you enrich a few while you impoverish the many. Explore the remote corners of the earth, you awaken inquiry, add to the stock of information, and contribute essentially to man's mastery over the elements.

"None among those who believe that money is well expended to increase knowledge, to improve the chances of life, to enlarge the commerce of our nation, and who appreciate the notable results already achieved in this special field of adventure and study, will belittle or sneer at the enterprise proposed in this bill. Some declare, by way of deprecation, that failure and disaster have been the reward of the dauntless explorer. In a certain measure, true. But the ends aimed at are worthy of sacrifice. Hall and Franklin died just as gloriously, just as serviceably, just as heroically, as Warren at Bunker Hill or Sedgwick at the Wilderness.

"Valuable experience and information have been obtained within past years which are now at the service of any new explorer, and new plans based on such experience and information have been examined by your committee, which point out the causes that have hitherto contributed to disaster and partial failure.

"This plan is known as 'polar colonization,' and has received hearty indorsement from such distinguished experts, scientists, students, and explorers as Prof. Joseph Henry, president of the National Academy of Sciences; Professor Loomis, of Yale College; President Potter, of Union College; Admiral Porter; Rear-Admiral Davis, superintendent of the National Observatory; Hon. Charles P. Daly, president of the American Geographical Society; Dr. Isaac I. Hayes, the explorer, and others, while it is heartily approved also by the honorable Secretary of the Navy; and your committee are inclined to commend it to the favor of Congress, more especially if its execution be intrusted, as the bill provides, to the President, under the direction of the National Academy of Sciences.

"The entrance to Robeson's Channel, 81° N., can be readily reached by steam vessels. Surveys by the *Polaris* in 1871, and the *Alert* and *Discovery* in 1875, have been made to a point within four hundred miles of the Pole.

"As the *Polaris* was reaching the northern extremity of Robeson's Channel, there appeared what was seemingly, and

what those best qualified to judge believed to be, an open polar sea. This sea could have been reached had the vessel arrived at such point even an hour before, and the dream of explorers would have been a reality; but the adventurous party were forced back, and wintered but a short distance from the unexplored waters.

"Captain Nares, in 1875–'76, encountered above this channel an unbroken field of ice, too solid to penetrate with vessels, too uneven to be traversed by sledge parties.

"So, it will be observed, seasons there are no less variable than our own. Sometimes the mighty fields of ice are broken up and carried away by favoring tides; sometimes the ice presents an impassable barrier.

"To succeed under such plans as have formerly been followed would be simply because chance supported them. To make success assured, the men and the vessels must be nigh the channel, ready for the fortunate hour, and prepared to take prompt advantage. To obviate the difficulty and meet the exigency, polar colonization is declared the appropriate mode, and is, therefore, urged by the distinguished gentlemen we have named.

"This plan requires that the colonization party should number at least fifty hardy, resolute men, enlisted in the United States for such service, provided with supplies and provisions for at least three years; that a strong, substantial building should be carried on shipboard; that the principal depot should be in Lady Franklin Bay, between 81° and 82°, or, if possible, as high as Cape Union, between latitude 82° and 83°; the United States vessels to be used only for transporting men and supplies to the location of the colony, the vessel then to return to the United States, and afterward to make annual visits with fresh supplies, and to keep the colony in communication with the outer world; military discipline to be enforced; three commissioned officers and two surgeons to be selected, with a view to their peculiar fitness; an astronomer and two or more naturalists to be selected by the National Academy of Sciences; and that one or more members of the regular force should be competent to make meteorological observations, and to communicate by telegraph and signals, when necessary.

"Such are the main features of the plan, which also provides that all due precaution shall be had to afford safeguards against scurvy, against the ill-effects of cold, and also to protect the colony from hunger.

"In the vicinity of the point where the colony is to locate, coal abounds, game is plentiful, Esquimaux men can be had to re-enforce and guide the expeditionary corps, and Esquimaux dogs to draw the sledges. The men become acclimated after a few years, and Captain Hall, who was eight years among the Esquimaux, testifies that each year ended found him better fitted to endure the severity of the Arctic Circle.

"Other nations are at this moment hurrying forward exploring expeditions to be prosecuted under this plan.

"Noble men in our own country are eager to enlist in the enterprise.

"Intelligent and liberal capitalists are ready to give of their means to forward it.

"There has never before been an opportunity afforded so promising in results as the one which now presents itself.

"To make such explorations entirely successful, it is essential that simultaneous observations be had at different points within the Arctic Circle, and for continuous periods of time.

"England, during the present year, will fit out two vessels, under the explorer Nares, on a polar expedition *via* the east coast of Greenland.

"Sweden, in 1878, under the auspices of Professor Nordenskjöld, will explore the polar regions *via* Norway across to by way of Behring's Strait.

"Holland has determined upon another.

"Germany, under the direction of the Arctic Exploration Society, has an Obi expedition, commanded by Captain Wiggins, now on duty.

"Russia, during the coming spring will push forward an ethnological expedition, under the Helsingsfors professor, to the Vogels and Ostyacs of the Obi and Irtysh.

"And eminent explorers as well as scientific societies of all civilized countries are busying themselves in an endeavor to establish stations at different points in the Arctic regions with a view of systematic synchronous observations, which are absolutely essential, with a view to progress in scientific discoveries.

"There is scarcely a natural science but would be enlarged and utilized by proper observations in the polar seas. Natural forces there are subject to extreme conditions, and, consequently, produce phenomena not seen elsewhere, and which serve to unveil the character of the forces themselves.

"Terrestrial magnetism, hitherto deemed a science of comparative unimportance, is now deemed the most consequential branch of physics; it is controlled by cosmical, atmospherical, and terrestrial action, and in the economy of nature exercises a reciprocal control.

"Reliable observations show the existence of galvanic currents and the relationship between magnetic disturbances and northern lights and earthquakes, while it is well known that magnetism is in inseparable connection with galvanism and electricity. In the extreme north, the needle is rarely stationary. There, too, the wrathful storms rage as nowhere else. Such are the reasons why, if this intensely interesting science is to grow, observations must be had in that remote archipelago of ice.

"Scarcely less interesting, and no less important to the world, than terrestrial magnetism is a knowledge of the atmosphere and its phenomena, especially their relation to heat and moisture, which is comprehended in meteorology. In the far north, and there only, can be ascertained the effect of that immense aggregation of ice; how heat is engendered and distributed; how dry and humid currents are created and put in motion to commingle and combat each other; to what extent climate is affected in this wise; and how hurricanes, which visit mankind with wrathful destruction, originate. Is it necessary to exhibit, by any process of reasoning, the utility of such knowledge, the advantages which would accumulate to science and to commerce?

"The flattening of the earth at the Pole, and the extraordinary refractions there, would yield such opportunities for investigation as would enable us to measure the earth with greater accuracy, to correct lines of latitude and longitude, and also greatly facilitate the study of astronomy.

"Natural history and botany would be vastly enriched, as is attested by the existence of rare flora and fauna.

"Geology has found there the groundwork of new theories and the explanation of many old ones. In Siberia are found animals of anterior worlds, while in Nova Zembla, Spitzbergen, and Greenland are fossils so abundant and rare that the paleontologist exults in his enlarged sphere.

"Wonderful already are the discoveries made in each field of inquiry noted; but we are yet in the vestibule. The region of the unknowable is just beyond; we are invited thither. We know enough to realize the wealth which awaits us.

"Hitherto observations have been limited and imperfect, the most important of them wholly neglected; accurate data as to all of the sciences named are wanting.

"Geographic discovery has hitherto been the objective point. While this is praiseworthy, while it adds a most important chapter to the book of knowledge, it should not be the primary object to which all others are subordinated.

"An absolute change of operations must be had. This change will be effected by the passage of the bill H. R. 4339. It meets the exact need. It provides for a long stay, which will give ample opportunity for observations and the conduct of scientific inquiry under the most favoring conditions. It provides that an intelligent system shall be pursued, under the direction of the National Academy of Sciences.

"Ordinarily, the expeditions have been so conducted as to actually preclude scientific discovery—all appliances left at home, and almost continuous locomotion.

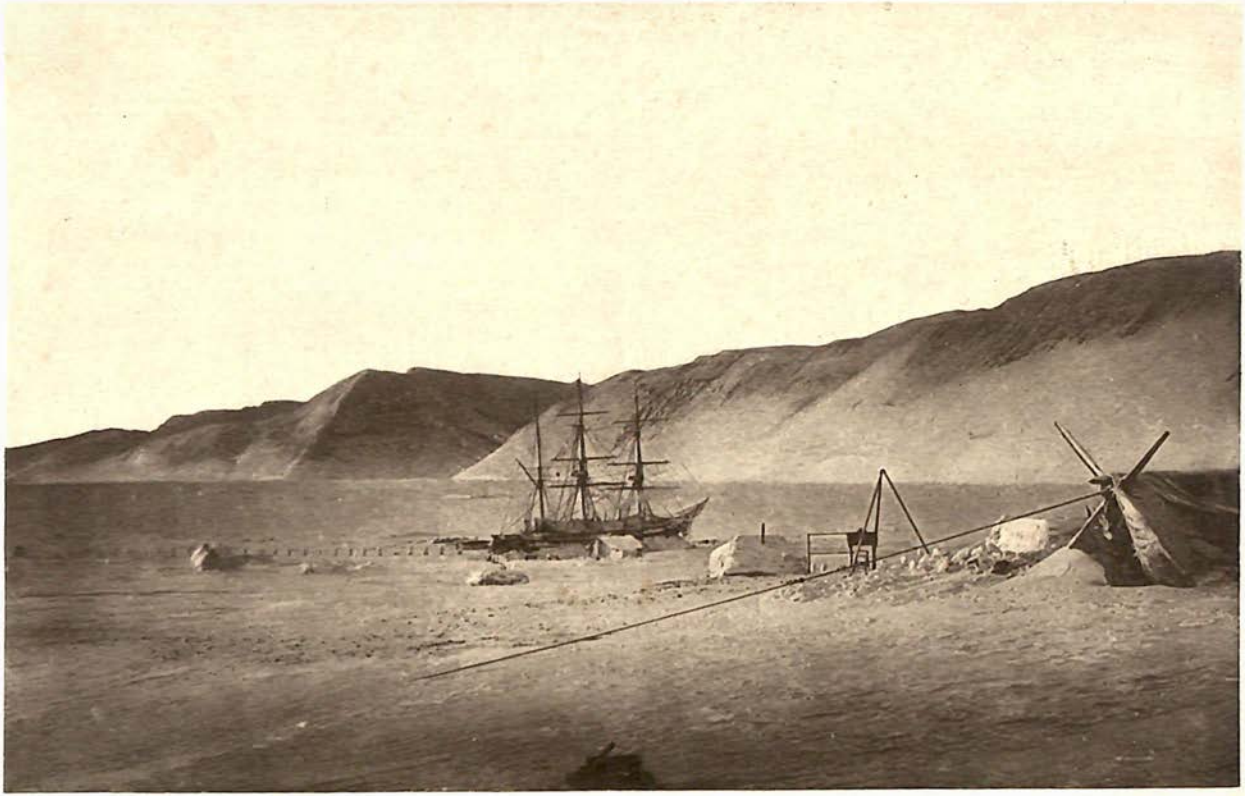
"Other nations are adopting the same methods, and while American scientists are taking observations in the vicinity of Robeson's Strait, like observations will be taken in Behring's Strait, on the east coast of Greenland, in the vicinity of Spitzbergen, and at other points, simultaneously covering the whole field—belting the whole arctic world—for several consecutive years.

"Other nations are already there or getting in readiness to be there. The way through Smith's Sound, where De Haven, Kane, Hall, and Hayes, by their heroic researches, have given immortal glory to America, seems to be the fittest field for Americans in this race for conquest and discovery. It is familiar, and other fields are already chosen by other governments.

"Dismiss the unsettled, vexed question, which is the most direct and practicable route to the Pole? Conditions vary. One year one is preferable, another, another; all are equally rich in scientific treasures, and will yield to searchers after knowledge an equal harvest, though the weight of testimony, even for geographical discovery, is in favor of the American route, as the exhibits appended indicate.

"The plan which this bill comtemplates happily blends geographical and scientific discovery; it will facilitate both, and result in both.

"The importance of the fitting out of this expedition at this particular time, with a view of co-operation with others, should not be out of mind, for meteorology depends upon



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DISCOVERY BAY, WINTER.

SITE OF THE PROPOSED POLAR COLONY.

comparison resulting from simultaneous observations. The laws of storms and the theories of winds depend upon such comparison. In no other mode can conclusive results be attained.

"If we make any pretense as friends of science, we must pursue the only methods whereby development can be achieved. Those methods have been pointed out. But supposing we should disregard the impulse of honor and glory; supposing we were controlled alone by the instinct of a supreme selfishness, which considers nothing but the questions, will it pay? will it help commerce? will it economize human life and property? there would still be sufficient reasons left to justify this undertaking.

"We can support this statement sufficiently by accepting the testimony of Prof. Elias Loomis, of Yale College, who says, in his admirable letter, hereto appended:

"'The vast extension of the commerce of the world in recent times, and its increased security, are due in no small degree to more accurate information respecting the physics of the globe, including such subjects as the mean direction and force of the prevalent winds; the laws of storms; the use of the barometer in giving warning of approaching violent winds; the surest mode of escaping the violence of a storm when overtaken by a gale; the most advantageous route from one part to another; the direction and velocity of the current in every ocean; the variation of the magnetic needle in all latitudes, and its changes from year to year; together with many other problems; and most of these investigations have been greatly facilitated by observations which have been made within the arctic regions. I do not regard it as any exaggeration to claim that the benefits which have resulted, both directly and indirectly, to the commerce of the world in consequence of polar expeditions, are more than equal to all the money which has been expended on these enterprises.'

"Last year a whaling fleet of twelve vessels was wrecked in the Arctic Sea, and property to the amount of half a million of dollars destroyed, all because of a lack of proper knowledge of climatic and tidal influences, which can alone be obtained by observations made in the manner provided for in this bill.

"Business men have a keen appreciation of the importance of these explorations to commerce. They have always been anxious to aid them by liberal contributions. Some of them

have been prosecuted solely by private means. The names of many merchants have been given to capes and bays and promontories and straits, as vouchers of the fame they have so justly earned by intelligent devotion to science.

"Boards of trade and chambers of commerce are now, through memorials, already before this committee, invoking us to pass this bill, and renew the honorable work.

"The cost is slight. The ends aimed at will provoke no intelligent opposition. The methods proposed are not experimental, but the product of experience. They have the sanction and even the warmest commendation of all scientific men of all nations. The supervision of the National Academy of Sciences will insure wise provisions and safeguards against accident, disease, or failure. Dr. Hayes, the eminent and successful arctic explorer, coincides fully with the views herein expressed, as also do others familiar by actual experience. Their letters are so instructive that we make them a part of this report.

"The honor of the American name is involved. Will Congress suppress this zealous spirit of inquiry and adventure, or give it scope by the passage of this bill, and a meager appropriation of fifty thousand dollars? To us it appears there should be but one answer, and, therefore, we report back the bill with a recommendation that it do pass."

On the 13th of February, Hon. A. A. Sargent, from the Naval Committee of the Senate submitted as the report of that Committee the House Committee's report above given, concurring in its conclusions and recommending the passage of the resolution.

On the 13th of June, Mr. Willis supported the measure in the following speech, which appears in the *Congressional Record* of the next day:

EXPEDITION TO THE ARCTIC SEAS.

"Mr. WILLIS, of New York. Mr. Chairman, in advocating the measure providing for an expedition to the Arctic Sea, I am assured no apology is required, even in this period of unparalleled business depression. The objects sought by the passage of the bill are so creditable to American spirit and character, so worthy the tradition of the Republic that I bespeak for it nothing but favor from the members of this House.

"The bill simply provides for an appropriation of $50,000

toward the expense of an Arctic exploration, to be conducted under the auspices of the National Academy of Science. The purpose of the expedition is scientific and geographical discovery. The plan, while essentially new, is justified by experience. It contemplates colonization, at a point between 81° and 82° north latitude, to be maintained for a series of years, with a view first of pushing far northward when occasion favors; secondly, of prosecuting for a long period systematic scientific observations—a plan most warmly seconded and approved by intelligent scientists of every country.

"Mr. Chairman, no man in this country exceeds me in reverence for the Constitution. I believe in the strict observance of all limitations on governmental powers; but, so far as the legitimacy of this appropriation is in question, there is no hook to hang a doubt upon.

"It is justified by an express provision of the Constitution

'TO REGULATE COMMERCE.'

"If any expenditure for this purpose is legal, then assuredly is this one; it contemplates the ascertainment of physical laws, which control storms and tides—methods whereby latitude and longitude can be accurately calculated; a mode of determining all the conditions which effect the variations of the compass. And certainly, sir, a commercial nation will not fail to recognize the advantage and the propriety of this expedition, especially a nation which recurs with so much pride and pleasure to the glorious achievements of Kane, of Wilkes, of Hall, and of Hayes.

"While the cost is slight, the benefits to accrue are incalculable. Every man who indulges in a smile of incredulity will be shamed when he learns from the testimony of a Loomis or a Henry, whose death we were called upon so recently to deplore, to what an extent the knowledge already acquired by like expeditions has been valuable; human life has been economized, and property saved amounting in value to twenty times the cost of all expeditions ever sent to that region of snow.

"Far back in the centuries nations worthy of the name, exulting in courage and enterprise, have been ambitions to seek knowledge in the remotest parts of the earth, when means were imperfect and people comparatively unintelligent. Will an American Congress, supposed to represent the most advanced civilization, ambitious to exert sovereign

sway over the seas, hesitate to encourage this movement? If it does, our proudest traditions will be belied; dishonor will tarnish our fame. It will indicate that as a nation advances in wealth and power it relapses in pride and enterprise, and becomes enslaved by ignorant selfishness.

"The American people demand the passage of this bill; let their Representatives respond with alacrity.

"Enterprising citizens, trusting to our public spirit, have already enlisted, have contributed their means, and sent forward an advance guard of this expedition. The Florence, under command of Captain Tyson, who is already famed for his courage in the same field of discovery, is now wintering in the far-away realms of the north, planting a colony there, and gathering supplies for the party expected to proceed thither so soon as Congress shall extend its aid by the passage of this bill. Private enterprise is in the van; shall we halt? Hundreds of hardy men, gentlemen, too, of the highest scientific attainments, are now awaiting an opportunity to join in the movement. Shall this spirit be suppressed?

"Never was there an opportunity so favorable.

"It is easy now to guard against the accidents and diseases which generally have overtaken the heroic adventurers in that region of ice.

"Other nations are all engaging in this glorious rivalry. England is fitting out one expedition, Sweden another, Russia another. All geographical and scientific societies are discussing with zest the projected enterprises, and everywhere the peculiar plan provided for in this bill commands approval and applause.

"All the faults and mistakes of former expeditions may be avoided.

"Remember always, that geographical discovery, though very important, though adding greatly to the stock of knowledge, is entirely inconsequential compared to the importance of the scientific results that are sought, and it must be subordinated. Hitherto it has been the aim, and the very fact that locomotion was insisted upon has defeated experiment and scientific discovery.

"To attain results sought, it is essential to make synchronous observations covering a long period of time; conditions vary to such an extent that observation and experiment here and there, now and then, have very slight value. On the plan proposed, taken in connection with other expedi-

tions in different parts of the arctic belt, every facility will be enjoyed for these simultaneous observations and experiments. During the next year England will be represented on the eastern coast of Greenland, Sweden at Behring's Straits, Germany at Obi, Russia among the Vogels and Ostyaks of Obi and Qrtysh.

"All the nations are industriously engaged in an effort to establish stations at different points of the arctic circles. Never in the past has there been such a promising field for discovery; what an aggregation of results if only carried out. Let us not hesitate in this race for glory.

"Why, sir, we now expend in our own country tens of thousands of dollars in our Signal Service alone. Is there a madman who proposes to abolish it? We expend tens of thousands more in maintaining a Naval Observatory. Is there a madman who would abolish it? And yet limited, indeed, is this field of inquiry. Meteorology and astronomy are the only sciences investigated, and under what limited conditions! How slight the play of natural forces. There is almost an entire absence of phenomena in either sphere.

"In pursuit of scientific truth go north! There extreme conditions abound, also phenomena seen nowhere else upon the globe. Phenomena so grand, startling, and intense that they divulge the most hidden mysteries of nature. Its workshop is there in full operation. You not only ascertain what pertains to meteorology, but to almost every branch of human science. A knowledge of terrestrial magnetism which is controlled by and exercises a reciprocal control over cosmical and atmospherical action. A knowledge of the atmosphere itself, its currents, its phenomena, its relation to heat and moisture, galvanism and electricity. The magnetic needle there is never stationary. The effect of those mountains of ice; how heat is engendered and distributed; currents put in motion to mingle in combat with each other; how climate is effected and how the wrathful hurricanes originate. Such are the subjects to be investigated, the sublime problems to be solved, which can be solved only in that far distant territory of ice and snow.

"Who will fail to recognize the utility of such inquiries, and who, realizing the advantage to commerce, the benefit to mankind, will begrudge the small appropriation asked for? I shall not stop to demonstrate the incidental results to proceed from this enterprise. Geology, natural history, paleontology, and botany will be enriched no less than the

sciences practically useful, for commercial purpose, which I have already hastily mentioned.

"Do not suppose that the Bennett expedition will dispense with the necessity of this one. Its object is praiseworthy; the prayers of millions will follow that adventurous craft; but its purpose is wholly different. Scientific discovery is not thought of. The discovery of an open sea, or a north-west passage is the daring aim of its heroic leader, whose ambition it is to eclipse his exploits in the interior of Africa with the grandeur of his daring among the icebergs of the Polar Sea, and may he and his countrymen speedily exult in the full fruition of his ambition.

"Let the two expeditions be rivals in the pathway of glory. Let it be proclaimed that the representatives of the people are exponents of all that is most glorious, most ennobling, most unselfish in American character. Let the crew of the *Florence*, far away in Cumberland Harbor—striving to accumulate provisions and prepare the way for the arrival of a colony, under the auspices of their Government receive some slight recognition for their self-denial. Do not, by heeding the voice of selfishness and sordid greed, compel them to remain there neglected to die or to return broken-hearted because discountenanced by a government they vainly strive to exalt.

"I attach the report I have prepared upon this subject, explaining more fully the character and purpose of the expedition."

On the 18th of June, a final effort was made to obtain action on the bill, Mr. Danford, of Ohio, moving in the House to suspend the rules and pass it. The bill was read and the question being put there were, ayes 65, noes 56. Mr. Danford then called for the yeas and nays which were ordered, and the vote being taken resulted as follows:

YEAS.

Messrs.	Acklen,	Dwight,	Jorgensen,	Robbins,
	Aldrich,	Eames,	Keifer,	Ryan,
	Bacon,	Ellsworth,	Kelley,	Schleicher,
	Bagley,	Fort,	Ketcham,	Sinnickson,
	Baker, Wm. H.	Foster,	Lapham,	Stewart,
	Blair,	Freeman,	Lathrop,	Stone, Joseph C.
	Boyd,	Frye,	Lindsey,	Townsend, Amos
	Briggs,	Garfield,	Loring,	Wait,
	Brogden,	Gause,	Marsh,	Walker,
	Bundy,	Gibson,	McCook,	Ward,
	Burchard,	Goode,	McGowan,	Warner,
	Burdick,	Hanna,	McKinley,	Welch,
	Butler,	Harmer,	Mitchell,	Wigginton,
	Cain,	Hart,	Monroe,	Williams, A. S.
	Campbell,	Haskell,	Oliver,	Williams, Andrew

Caswell,	Hendee,	O'Neill,	Williams, Richard
Claflin,	Henderson,	Overton,	Willis, Albert S.
Conger,	Henkle,	Phelps,	Willis, Benj. A.
Cravens,	Henry,	Phillips,	Willits,
Danford.	Hunter,	Pollard,	Wren.—86.
Davis, Horace	Ittner,	Pugh,	
Dunnell,	Jones, Frank	Reed,	

NAYS.

Messrs.	Aiken,	Cutler,	Hubbell,	Ross,
	Atkins,	Davidson,	Humphrey,	Sampson,
	Baker, John H.	Davis, Joseph J.	Hunton,	Sapp,
	Bell,	Dean,	Jones, James T.	Scales,
	Blackburn,	Deering,	Jones, John S.	Sexton,
	Blount,	Denison,	Keightley,	Shelley,
	Bouck,	Dibrell,	Kenna,	Singleton,
	Bragg,	Dickey,	Knott,	Smith, A. Herr
	Brentano,	Durham,	Ligon,	Smith, Wm. E.
	Brewer,	Eden,	Lockwood,	Southard,
	Bridges,	Elam,	Luttrell,	Sparks,
	Bright,	Errett,	Lynde,	Springer,
	Browne,	Evans, I. Newton	Mackey,	Starin,
	Cabell,	Ewing,	Maish,	Steele,
	Caldwell, John W.	Felton,	Mayham,	Stenger,
	Calkins,	Finley,	McKenzie,	Stone, John W.
	Candler,	Forney,	Metcalfe,	Strait,
	Cannon,	Franklin,	Mills,	Thompson,
	Chalmers,	Fuller,	Morgan,	Throckmorton,
	Clark of Missouri,	Gardner,	Morse,	Townsend, M. I.
	Clarke of Kentucky,	Garth,	Muller,	Townshend, R. W.
	Clymer,	Giddings,	Patterson, G. W.	Tucker,
	Cobb,	Hamilton,	Patterson, T. M.	Turner,
	Cole,	Hardenbergh,	Pridemore,	Turney,
	Collins,	Harris, Henry R.	Randolph,	Vance,
	Cook,	Harrison,	Rea,	Veeder,
	Covert,	Hartridge,	Reagan,	Waddell,
	Cox, Jacob D.	Hartzell,	Reilly,	White, Michael D.
	Cox, Samuel S.	Hayes,	Rice, Americus V.	Whitthorne,
	Crittenden,	Herbert,	Riddle,	Williams, James
	Culberson,	Hewitt, G. W.	Roberts,	Wilson.—127.
	Cummings,	Hiscock,	Robinson, G. D.	

NOT VOTING.

Messrs.	Ballou,	Eickhoff,	Landers,	Sayler.
	Banks,	Ellis,	Manning,	Shallenberger,
	Banning,	Evans, James L.	Martin,	Slemons,
	Bayne,	Evins, John H.	McMahon,	Smalls,
	Beebe,	Glover,	Money,	Stephens,
	Benedict,	Gunter,	Morrison,	Swann,
	Bicknell,	Hale,	Muldrow,	Thornburgh,
	Bisbee,	Harris, Benj. W.	Neal,	Tipton,
	Bland,	Harris, John T.	Norcross,	Van Vorhes,
	Bliss,	Hatcher,	Page,	Walsh,
	Boone,	Hazelton,	Peddie,	Watson,
	Buckner,	Hewitt, Abram S.	Potter,	White, Harry
	Caldwell, W. P.	Hooker,	Pound,	Williams, C. G.
	Camp,	House,	Powers,	Williams, Jere N.
	Carlisle,	Hungerford,	Price,	Wood,
	Chittenden,	James,	Quinn,	Wright,
	Clark, Alvah A.	Joyce,	Rainey,	Yeates,
	Clark, Rush	Killinger,	Rice, William W.	Young.—78.
	Crapo,	Kimmel,	Robertson,	
	Douglas.	Knapp,	Robinson, M. S.	

So (two-thirds not voting in favor thereof) the rules were not suspended.

THE PRELIMINARY ARCTIC EXPEDITION OF 1877–78.

In the spring and early summer of 1877, a number of public spirited and generous citizens of the United States, having faith in the success of the Colonization plan as a means of Arctic exploration, and believing in its ultimate approval by Congress, in substantial accordance with the bill reported favorably from the Committee on Naval Affairs of the House of Representatives at the last session of the Forty-fourth and at the second session of the Forty-fifth Congress, contributed from their private means a sufficient sum for the purchase and outfit of a small vessel to be sent to the Arctic seas for the purpose of collecting such supplies during the winter of 1877–78, as might be useful for the main expedition of 1878, if that expedition should be authorized. It was at first intended to limit the mission of this vessel to the collection of material only, but the opportunity for scientific investigation was so inviting, and the added cost incurred thereby so very trifling in comparison with the results to be attained, that space was made on board for two observers and their necessary apparatus. One of these observers was selected upon the recommendation of Professor Elias Loomis, of Yale College, and instructed to pay especial attention to meteorological phenomena, while the other was selected as naturalist of the expedition by Professor Spencer F. Baird, of the Smithsonian Institution, from whom he received special instructions.

Captain George E. Tyson, who served on board the *Polaris* with Captain Hall, was entrusted with the task of selecting a suitable vessel for the preliminary expedition, which, while large enough to accomplish the desired objects, would not exceed in cost the sum available for its purchase and outfit. After careful examination he selected the *Florence*, of New London, a schoonor of fifty-six tons burden which was purchased upon his recommendation, and the work of strengthening her for ice navigation at once commenced under his personal supervision. It was at first hoped to have the vessel ready for sailing on the 25th of July, 1877, but the illness of Captain Tyson, and the prevalence of rainy weather delayed her until the morning of August 3d, upon which date she sailed with a full crew and complete outfit for one year's work, including the necessary apparatus for a whaling voyage on a small scale, in order that the vessel

on her return voyage might bring a cargo of bone and oil, and thus make the enterprise a self-supporting one, if possible.

The public interest evinced in the proposed Arctic colony was very gratifying from the first, and the fitting out of the preliminary expedition brought applications in great numbers, both personal and by letter, from parties desirous of accompanying it as members of the crew, as passengers, or in any capacity that would enable them to share in the prospective honors of the enterprise. The good material offered was so large that it made the selection a difficult task; but it is believed that no little band, better fitted for the work, by strong frames, courage, and endurance, ever went forth to the Arctic seas than those who sailed upon the *Florence*. The officers and crew were as follows:

George E. Tyson, New London, master; William Sisson, New London, first mate; Dennison Burrows, New London, second mate; Eleazer Cone, New London, steward; Orray Taft Sherman, Providence, meteorologist and photographer; Ludwig Kumlein, Madison, Wisconsin, naturalist; Richard B. York, Norwich; William A. Albin, Sag Harbor; James W. Lee, New London, and Joel B. Bottles, of Granby, seamen. Charles Henry Fuller, Colchester; David E. Keese, York, Pennsylvania, and John McParland, New London, green hands. Of the crew the youngest was nineteen years old, and the oldest only twenty-four.

The *Florence* was a good sea-boat, staunch, stout, sea-worthy, and a fast sailer, and was thoroughly strengthened for her encounters with the ice. The supply of provisions and other stores for officers and crew was ample for twelve months, and might, if necessary, be made to last six months longer. Kind friends from all parts of the country contributed from their stores, in addition to articles of food and clothing, a liberal supply of books and papers to while away the long, weary hours of the sunless Arctic winter. A spare berth in the forecastle was filled with story-books, histories, novels, and volumes of poetry. A large trunk was filled to overflowing with papers, and still another loaded down with magazines; the whole making a library of considerable dimensions. The heads of several Departments of the Government showed a kindly interest in the expedition, not merely by verbal approval, but by substantial aid. The different bureaus of the War Department, acting under the authority of the Secretary of War, were particularly active

in the matter. The Ordnance Office furnished rifles and muskets, and necessary ammunition. The Chief Signal Officer of the Army supplied a complete outfit of necessary instruments for making meteorological obserservations. The Surgeon General furnished a supply of medicines and the necessary minor surgical instruments for use in case of accidents to members of the expedition, and the Quartermaster General furnished tents and camp equipage. The Secretary of the Navy furnished a complete outfit of maps, charts, and sailing directions. To these heads of Departments and Bureaux the grateful thanks of the friends of Arctic exploration are due for their timely and efficient aid. The citizens of the United States, from all quarters and all directions, came forward with contributions in money or in kind, in support of the undertaking. No better test of the interest felt in the subject, and the conviction entertained of its importance and the ultimate success of the expedition, could be found than in this widely spread and voluntary support. Many of these contributions were accompanied by letters filled with prayers for the success of the undertaking. All classes of the community, and all portions of its territory were represented in these donations; and it would be invidious to name those who gave largely, while so many gave, from their humble store, what may most aptly be termed "the widow's mite."

The following instructions, furnished to Captain Tyson upon the day of sailing, will give an idea of the aim, objects, and scope of this preliminary expedition:

WASHINGTON, *July* 19, 1877.

CAPTAIN GEORGE E. TYSON,
Commanding Preliminary Arctic Expedition of 1877,
New London, Connecticut.

SIR: The command of the schooner *Florence*, of the Preliminary Arctic Expedition of 1877, is intrusted to you, and the officers and men forming the crew are enjoined to render strict obedience to your orders.

In the event of your death while on this expedition—an event which is to be devoutly hoped may not occur—the command will devolve upon the first mate, and should he also be disabled or die, upon the second mate; and such survivor will carry out, to the best of his ability, the objects of the expedition, keeping a stout heart and committing himself and comrades to the care of Divine providence.

THE OBJECT OF THE EXPEDITION.

The primary object of the expedition is the collection of material for the use of the future colony on the shores of Lady Franklin Bay. This material will consist of Esquimaux to the number of ten families—if that number can be obtained of young, strong, healthy persons willing to be transferred to the location of the future colony—of dogs, not less than twenty-five in number, mostly females, and selected for their docility, training, strength, and endurance; of sledges, two in number, and completely and carefully fitted up for travel, and of clothing in ample quantities to supply fifty persons for three years. The clothing will be carefully selected, of choice furs and skins, and all made up by native women. The secondary object of the expedition is the collection of scientific data and specimens, as the field is a new one and possessing unusual interest.

WHALING EN VOYAGE.

The third, and to the crew most interesting object, is the capture of a sufficient amount of bone and oil to make a profitable return cargo, and this part of the work is so completely within your own province that I will not venture to give any instructions. I must caution you, however, to be on your guard against letting the pursuit of gain interfere in any manner with the successful issue of the two first named objects of the expedition. It is from them that the lasting results of the voyage will be obtained, and the interests of science and commerce best subserved. The precise locality of your winter quarters is left in a great measure to your judgment, but should probably be on the northern side of Cumberland Island. In making the selection, if the state of weather and condition of the ice leaves any choice, the locality should be that which is best adapted for the collection of supplies, and which offers the best facilities for breaking out in the summer of 1878, in time to reach Disco by August 1, if possible, and certainly not later than August 6.

CARING FOR THE NATIVES AND DOGS.

Provision must be made for the proper maintenance and care of the natives who are to become members of the future Polar Colony; and also of the dogs, which are to form so important a part of the outfit of that colony. They must be quartered as comfortably as the limited accommodations of the schooner will permit, fed well and kept thoroughly clean.

THE SCIENTISTS.

The two scientific members of the expedition, while not forming, strictly speaking, a part of the crew, will, in case of necessity, be required to perform duty, and will at all times be subject to your orders and discipline. Every proper facility will be given them in the discharge of their respective duties and to aid in securing full and valuable results from their labors. Mr. Sherman will have charge of the meteorological instruments, observations and records, and of the photographic apparatus and work. In both of these duties it is my wish that you should aid him, cheerfully and constantly, and in the event of his sickness or inability, from any cause to attend to his observations, to make such arrangements as will insure a continuous series of the most important ones. The utmost caution must be exercised in handling the delicate instruments, to guard against their breakage or other injury and the consequent interruption of the observations. The results of the photographic work will be very interesting to the general public as well as to the scientific student, and every opportunity should be taken to secure good negatives of places, localities and objects, and also of the different operations connected with the pursuit and capture of whales, seals, &c. Mr. Kumlein, who goes as the representative of the Smithsonian Institution under the instructions of Professor Spencer F. Baird, the distinguished naturalist, for the purpose of collecting specimens of the flora and fauna of the country, will be accorded the most ample facilities for the performance of his duties consistent with a proper regard for the main object of the expedition. His labors, if properly supported and reasonably successful, will prove, it is hoped, of lasting advantage, and make the expedition a notable one in scientific annals.

THE EXPEDITION OF 1878.

On reaching Disco in August, 1878, if the vessel carrying the members and outfit of the colony has arrived, you will transfer to such vessel the Esquimaux, dogs, sledges, and clothing collected for the purpose, and take the commanding officer's receipt for the same. This being done, you will return as rapidly as possibly to New London, whence you will report by telegraph to me at Washington, D. C., for further orders. If the colonization vessel has not arrived you will wait for it until August 15, when you will store the sledges

and clothing to the care of the Governor of Disco; leave the dogs also in his care, and return the natives to their home on Cumberland Island. This done you will return to New London and report, as before, for instructions.

Should any of your crew wish to accompany the colonization you will grant them permission to do so, with the consent of the commander of that expedition, and provided you retain enough men to bring the *Florence* safely back to the United States.

TEMPERANCE.

Great care must be exercised in the use of spirituous liquors, both among the members of the expedition and in dealing with the natives. Useful as liquor undoubtedly is in its place, and under suitable restrictions, it is easily capable of the most frightful abuse and of leading this expedition to disaster as it has done others in the past. I trust in your strong, good sense and past experience to guard against danger from this source, and desire you to know that I have only permitted a supply in quantity of liquors to form part of the *Florence's* outfit in deference to your own strongly expressed wishes.

DEALING WITH ABORIGINES.

In dealing with the natives, it is my wish, as doubtless it is your inclination, that you should be kind and liberal to the extent of your means and ability, and in all points of difference, should any arise, to be just but firm.

FINAL.

Bear constantly in mind the fact that this is not a whaling voyage but the first step in a work that will, I trust, when completed, be a noteworthy one in the annals of geographical and scientific discovery. The fact should also be carefully impressed upon the crew, in order that they may work intelligently and with proper interest.

Be careful of the health of your men, using such measures for the purpose as your long experience in Arctic waters suggest as necessary.

In conclusion, I commend yourself and crew to the care of an All-wise Power, with the prayer that your voyage may be prosperous and your return a safe and happy one.

H. W. HOWGATE,
United States Army.

INSTRUCTIONS TO THE METEOROLOGIST.

WASHINGTON, D. C., *July* 10, 1877.

MR. O. T. SHERMAN,
Meteorologist, Preliminary Arctic Expedition of 1877,
New London, Connecticut.

SIR: The accompanying instructions were kindly prepared by Professor Cleveland Abbe, and are furnished you as suggestions for your general guidance in making meteorological observations. These suggestions may possibly be modified of necessity by varying circumstances and conditions, but should not be departed from in any important degree:

1. It is considered very desirable to maintain a system of regular hourly observations night and day, for the record of which the accompanying blank book will serve as the first volume, one horizontal line being devoted to each hour, and at least four pages devoted to each day's record, so that both regular and miscellaneous observations and notes may all appear together in the same book.

Even if hourly observations cannot be maintained regularly by yourself and those of the ship's crew who can assist you, still it will be best to rule the book as for hourly observations, and attempt a bi-hourly or a tri-hourly series, filling in intermediate hours whenever possible.

2. As regards the time to be used in recording observations, it is especially enjoined that you do not attempt to employ local times, but that you uniformly employ the Washington mean time as given by the ship's chronometer, and to which your own watch should always be regulated. Furthermore, it is evidently of little importance whether the series of observations are made at the beginning of each hour or at some other minute, and it is therefore preferred that your regular records be made at 0.35 A. M., 1.35 A. M., etc., dating them, of course, according to civil reckoning, by which means three of your observations will become simultaneous with those of the Signal Service, and will thus form a valuable addition to its bulletin of international simultaneous observations.

3. Accompanying this you will find a schedule suggesting that arrangement of the vertical columns on each page,

which experience has shown to be most convenient. The contents of these columns are as follows:

1. Hours of observation.
2. Attached Thermometer.
3. Reading of the Barometer.
4. Barometric Corrections and Reductions, viz:
   Correction for Instrumental Error.
   Correction for Temperature.
   Reduction to Sea Level.
5. Atmospheric Pressure at Sea Level, or the Barometer as corrected and reduced.
6. The Dry Bulb Thermometer.
7. The Wet Bulb Thermometer.
   (Both should be read to tenths of a degree.)
8. Relative Humidity.
9. Force of Vapor.
10. Dew Point. (8, 9, and 10 taken from Guyot's Regnault.) 11. The reading of the Hair Hygrometer. (If possible, several of these will be furnished for comparison.)
12. True Direction whence the wind blows.
13. Estimate Force of Wind (on the International scale of zero to ten.)
14. Reading of the Anemometer Dial. (If possible, two anemometers, one elevated much higher than the other, should be used. The simple, single reading of the dial running up to 9999 is all that need be recorded, as the hourly and daily velocities can be deduced subsequently.)
15. Repetition of column 1.
16. The Amount (in tenths,) kind and direction of the Upper Clouds. (Pay close attention to the direction, and record it with reference to the true meridian of the sixteen compass points; give the direction whence the clouds move, and, to secure accuracy, have a fixed point, on the earth by which to judge of their motions.)
17. Ditto for the lower clouds. (If three layers are seen, record the middle one in the miscellaneous notes.)
18. The color of the sky near the zenith, as compared with the standard scales B., R., or G., (blue, rose, gray.)
19. Ditto for the zenith distance 45°.
20. The Weather—that is to say, the most striking characteristics of the weather.
21. The fall of Rain, or heavy mist, during the proceeding hour.
22. The fall of snow and sleet unmelted.

23. The amount of melted snow and sleet. (These observations can be made on ship-board to a considerable advantage by placing two or four rain gauges symmetrically on the starboard and larboard.)

24. The Record of the Tide Gauge. (This very important observation should be carefully attended to whenever on shore or frozen up during the winter.)

25. Temperature of the ocean water near the surface.

26. Temperature of the ocean water at a constant depth of about twenty feet.

27. The color of the ocean water as compared with standard scales, G., B., Y., and R., (green, blue, yellow, and red.)

28. Direction and Intensity of the ocean swell or waves.

29. Repetition of column 1.

30. The Deviation of the magnetic needle. (For this observation a delicate compass needle will serve if no appropriate magnetic apparatus can be obtained. Its fluctuations will probably be quite decided during Auroras.)

31. The visibility of Auroras, Halos, Zodiacal Light. (The three phenomena should be carefully looked for on all occasions, and if visible, the appropriate word or the corresponding symbols agreed upon at the Vienna Congress should be entered in this column, reserving a fuller description for the miscellaneous notes.) Aurora, Lunar Halo, Solar Halo, Lunar Corona, Solar Corona.)

32. Regnault's apparatus for observing the Dew Point should be employed systematically, if any way possible to do so.

33. Among the especially interesting observations is that of the actual height of clouds and direction of air currents, as revealed by sending up small balloons, which are furnished you for this purpose. Attach to each balloon a light thread, one hundred feet long, in such a manner that it will pull away at the slightest tension. Hold the other end of the thread fast in the fingers, and count seconds from the watch while the balloon is ascending. Record in column 33 the number of seconds required to ascend 100 feet, which is the vertical velocity of the balloon.

34. The horizontal direction taken by the balloon.

35. Its horizontal velocity, as estimated by comparison with the surrounding country.

36. The time elapsing before it disappears in the clouds.

37. The Density of the sea water.

Columns 1 to 14 occupy page 1; columns 15 to 28 occupy

page 2; columns 29 to 37 occupy portion of page 3. The rest of page 3 and the whole of page 4 of each day's record is to be occupied by short miscellaneous notes, among which are to be included the latitude and longitude of the vessel when at sea. If you visit any port at which meteorological records are kept, you should not fail to compare your instuments with those used at such places, as a check upon the agreement of the records.

Among the numerous miscellaneous observations that are desirable from northern latitudes are many that will be found referred to in the Manual and Instructions for the Arctic Expedition of 1875, to which you are hereby referred, as also to the reports of the Permanent Committee of the First International Meteorological Congress at Vienna:

(Page 1.)

1877, *August* 7, *Monday, at sea, &c.*

Washington Time.	Barometer.				Psychometer.					Relative humidity.	Wind.		
	Attached thermometer.	Barometer.	Corrections and reductions.	Barometer corrected and reduced.	Dry-bulb.	Wet-bulb.	Relative humidity.	Force of vapor.	Dew point.	Hair hygrometer—Relative humidity.	Direction.	Force.	Anemometer readings.
Hours.													
12 h. 35m. A. M													
1h. 35m. A. M	2	3	4	5	6	7	8	9	10	11	12	13	14
2h. 35m. A. M.													

(Page 2.)

1877, *August* 7, *Monday, at sea, &c.*

Washington Time.	Upper Clouds.			Lower Clouds.			Color of Sky.		Rainfall.			Ocean.				
	Amount.	Kind.	Direction.	Amount.	Kind.	Direction.	Zenith.	Forty-five degrees.	Weather.	Rain or mist.	Snow and Sleet.	Tide regular.	Temperature.		Color of water.	Swell or waves.
											Not melted. Melted.		Surface.	Deep.		
12.35 A. M....		16			17		18	19	20	21	22 23	24	25	26	27	28
1:35 A. M.....																

(Page 3.)

1877, *August* 7, *Monday, at sea, &c.*

Washington Time.	Deviation of magnetic needle.	Auroras, halos, zodiacal light.	Regnault's dew point.	Small Balloons.				Density of sea water.
				Vertical velocity.	Horizontal.		Difference in clouds.	
					Direction.	Velocity.		
	30	31	32	33	34	35	36	37

(Page 4)

1877, *August* 7, *Monday, at sea, &c.*

Short miscellaneous notes.

In addition to the foregoing the following suggestions of Professor Loomis are furnished for your information and guidance:

"The meteorologist should be specially instructed, not only to make the routine observations at fixed hours, but also to be constantly on the watch for every unusual phenomenon connected either directly or remotely with meteorology. He ought to keep a detailed record of all auroral phenomena, and it is extremely desirable that the expedition should have suitable instruments for the declination of the needle, and the changes which accompany auroral display. I think particular attention should be given to observing the direction of the wind, and also the direction of the highest visible clouds, and their direction ought to be recorded with great precision. Especial attention should be given to the optical phenomena of the atmosphere, such, for instance, as halves-parhelia, &c. The polar regions exhibit phenomena of this class more remarkable than those we often see in the middle latitudes, or, perhaps, have ever seen, and these observations, to be of much value, should furnish precise measurements of the dimensions and portions of whatever is observed, particularly of those features which are most unusual."

These special suggestions, with such general ones as you will find in the Arctic Manual, in Professor Loomis' Work

on Meteorology, in Buchan's Handy-book, and the other works on Meteorology which have been furnished to you will be sufficient to indicate the extent of the work to be done, and its most valuable features. It is especially impressed upon you to keep full and detailed notes of all items of daily observation and occurrence, in order that nothing of value may be lost. The memory must not be trusted for details, but everything intended for future use should be committed to writing at the time the matter is fresh and capable of verification.

H. W. HOWGATE,
United States Army.

MEMORANDUM ADDRESSED TO J. KUMLEIN, NATURALIST OF THE EXPEDITION, RELATIVE TO THE NATURAL HISTORY OF THE REGION TO BE VISITED; BY PROFESSOR SPENCER F. BAIRD.

The region you visit is one of the most interesting in North America, and the least explored by the naturalist. It will furnish an ample field for research, especially as you will be on shore during the greater part of your absence from the United States.

Your principal object should be to make collections of everything in the ethnological, animal, vegetable, mineral, and fossil departments, so that you can prepare a report thereon, perhaps an illustrated one, to be published in some suitable manner upon your return. In view of this you should make copious notes of the habits, associations, and general condition of everything that you meet with.

Of mammals, good mountable skins of the polar bear, prepared with alum or saltpeter, will be desirable. A series of reindeer should also be obtained, as well as foxes, hares, and other animals. A good series of seals properly prepared will enable us to solve many questions in regard to our own species at home.

The walrus, both male and female, should be procured.

As many skeletons as are procurable, and several skeletons of all land and water mammals will be readily marketable.

The skins of cetaceans cannot readily be preserved unless possibly they can be preserved in salt. Sketches should be made of the outlines and distribution of color of each, and the corresponding skulls and skeletons should be preserved.

Particular attention should be paid to the narwhal, skeletons of which are much in demand.

If opportunity is allowed you, some skulls of the smaller whales ought to be procured.

Regarding birds, a special memorandum, prepared by Dr. Brewer and myself, has been furnished. You will, of course, look very carefully for the small insectivora and conirostres, to determine, as far as possible, the northern distribution of our species. Saxicolas will probably be frequently met with.

Of water fowl, the rarer geese, the Labrador duck, Sabine's and Ross's gulls, and the Ivory gull are those which it is most desirable to obtain.

Any petrels or shearwaters will also be of interest.

Endeavor if possible to obtain specimens of black guillemot, with a blackish bar partly across the white of the wing.

Reptiles you will probably not find, unless it may be a frog, which of course should be secured.

The fishes should be looked after very particularly, and especially the different species of trout, salmon, and white fish, which should be secured, if possible, of different ages and in the different seasons, to show the variations of the spawning condition.

Any large salmon or trout, say over a pound or two in weight, would be better preserved by being skinned and the skins put in alcohol, although a sketch of the original ought to be made. Any other species of fish you had better procure as they may present themselves.

Of course it will be important to obtain a full representation of the insects of the country, such as butterflies, beetles, etc.

Whatever species of marine invertebrates are procurable should be gathered in; for example, star-fish, shells, crustaceans, and the like.

If you should succeed in securing a complete series of all the varieties of animal life, if possible, in several sets, the great object of your mission will have been accomplished.

You should endeavor to secure a variety; but a complete collection will be of much interest. Any choice mineral specimens ought to be obtained, especially of the crystaline varieties. Get samples of all the rocks constituting the strata. These should be sketched, with their overlying position indicated and verified by specimens.

Look very carefully for rocks containing fossil remains, either of plants or of animals Some very interesting specimens of saurians have been brought from different portions of Arctic America, while the fossil plants are of very great importance.

Make a thorough study of the ethnology of the country, securing as many crania of Esquimaux as practicable; procure skeletons also if they can be got. Illustrations of the handiwork of the natives in objects of stone, bone, wood, etc., ought to be carefully gathered, especially any that are of great antiquity, and such as are superseded by modern articles.

SPENCER F. BAIRD.

Salem, Mass.

The following extract from the London *Standard* of August the 18th, 1877, is of interest, as showing the appearance of things on board the *Florence* when about to sail:

"An occasional correspondent writes from New York: On the morning of Tuesday, the last day of July, I saw an announcement in the New York *Herald* to the effect that the Arctic exploring ship *Florence*, under the command of Captain George E. Tyson, would sail from New London on the following day. I immediately resolved, as a member of the last British Polar expedition, to go down and give him and his comrades a hearty farewell and God speed. I took a passage in the handsome steamer *City of New York*, and leaving New York city in the evening woke next morning at New London. It is a pretty little town of 12,000 people, situated on the Thames, a fine river, wider than the English one after which it is named. New London is of considerable importance as a seaport, and you meet there a number of persons who have been actively employed in whaling and sealing. Inquiring my way to Haven's Dock, where the *Florence* lay, I soon found her alongside the jetty, some caulkers closing the hold, and the men carrying on board their beds and clothes bags. On the upper deck were some casks of water and barrels of biscuits, firmly lashed; also, planks and spare spars. The *Florence* is quite a small vessel, a schooner of 56 23-100 tons. She has storage capacity for 300 barrels of oil. She was built at Wells, Maine, in 1851, but is still a staunch craft and good sea boat. Pre-

paratory to her last cruise she was thoroughly overhauled and renovated, and made as good as new. Her length is 64 feet, beam 19 feet, and she has a depth of 7 feet. She carries no foretopmast, and is an aft schooner with a square sailyard athwart. Stepping across a plank, I gained the deck, and going aft, discovered the officers' cabin. It is a small space, measuring about eight feet in all three directions, and having a small table in the centre; overhead were stowed half a dozen Springfield rifles and a double barrelled gun. On each side of the cabin are two bunks, one above the other. Those on the port side are appropriated to the use of the scientific officers, and the other two to the second mate and steward. When I was there the former gentlemen were busily engaged in stowing their effects in their bunks under their beds. Tins of sardines, novels, and newspapers were oddly mingled with articles of clothing and scientific instruments.

There appeared to be plenty of space, but imagine the labor of constantly having to disarrange the entire collection in order to obtain some trifle which happens to be placed at the bottom! Aft of the cabin, and on either side of the entrance to it, are two "state rooms"—a pretentious title for little dens of six feet by four, half of which limited space is occupied by the bed placed over a small chest of drawers. These sanctums are designed for the captain and first mate. On the other side of the cabin is the kitchen, a little chamber not five feet high or four feet wide. The crew, of whom there are eight, are located in a small cabin in the bows; they have good, wide bunks, which appear comfortable enough. The walls of the officers' cabin are of 4-inch plank. The stem has been replanked with 10-inch timbers, covered with 2-ineh planks, giving her bow a total thickness of sixteen inches, sufficient to resist the blows from floating masses of ice which she may expect to encounter in the North. She carries a sufficient stock of provisions, pork, canned meats, biscuits, and spirits; also 15 tons of coal. She is well provided with ammunition, having 6,000 ball cartridges, 1,000 pounds of buck shot, two barrels of powder, and 200 pounds of rifle powder. She also takes plenty of whale line, as she hopes to secure some whales in Baffin's Bay. The *Florence* carries three boats, one hanging astern from davits, and one on each quarter. The Stars and Stripes floated bravely at the masthead; the morning was bright and fine, and a number of spectators came on board to see the vessel,

or stood on the jetty discussing her chances. Captain Tyson is accompanied by William Sisson, a portly native of New London, as first mate. Dennison Burrows, of New London, is second mate, and Eleazer Cone, also of New London, is steward. Mr. Orray Taft Sherman, of Providence, a graduate of Yale, '77, and a fine, tall young man, undertakes the duties of meteorologist and photographer, whilst Mr. Ludwig Kumlein, of the Smithsonian Institute, is naturalist.

The crew consists of eight fine young fellows of from 19 to 24 years of age, with one exception all natives of New London, and accustomed to a seafaring life. They seemed to me the right men for the work, and had only been engaged on the day before I visited the ship. Asking one of them what his pay would be, he replied, "A fiftieth." When I said "What of?" he replied, "I don't know and care less." They seemed equally indifferent as to when they return, but have the option of coming back next year.

I afterwards crossed the river in the ferry to call on Captain Buddington, who was sailing master under Captain Hall in the *Polaris* in 1871, and took the command after his death. Asking to be directed to the Captain's residence, which is a mile or so from the town, I was offered a seat in his buggy by a gentleman who was driving that way, with that kindness which is so pleasing a characteristic of the educated American. There we found the worthy Captain amusing himself, as many old sailors love to do, by working in his garden in the cool of the evening. On my introducing myself he welcomed me into his comfortable cottage, where we conversed for some time on Arctic work and enterprise. He is deeply interested in the matter, though after 40 years' work amongst the ice in the Northern and Southern seas, he justly thinks himself entitled to end his days in the peaceful serenity of a rural life. On my rising to go he kindly accompanied me half way to the town, and there Captain Tyson came on board the steamer, and wished good-bye to Captain Howgate and myself, as we were returning to New York.

The *Florence* had been unable to leave, because of the state of the wind, but it was intended that she should weigh anchor next morning. May this expedition advance a step further than its predecessors into the unknown regions, and add more facts to the sum of human knowledge."

At ten minutes past ten, on the 3d of August, the tug took

her in tow, and with a stiff fresh breeze filling all her canvas, and keeping her bow for bow with the steamer, she went flying down the harbor, dipping her colors in farewell to friends on shore, who watched her out of sight. On board all was snug and ship-shape; both officers and men were impatient of the delay which they had met with, and gladly saw the tug steaming out to take her in tow. A fact pleasant to be remembered was the absence of any appearance, much less the reality, of any intoxication amongst the crew of the little vessel.

The following communication from Captain Tyson was received on the 26th of August, 1877:

SCHOONER FLORENCE, *August* 9, 1877.

Captain H. W. HOWGATE,
United States Army, Washington, D. C.

SIR: I have the honor to report the progress of the Preliminary Polar Expedition.

August 2, half past ten A. M., we left New London, with the wind to the northeast. The progress made on the succeeding days and the facilities for sailing will be shown by the following citation from the log:

August 3.—Lat. 40 52, lon. 70 36; wind N. E.; course, magnetic, S. E.

August 4.—Lat. 40 40, lon. 68 50; wind N. E.; course, E. S. E.

August 5—Lat. 41 52, lon. 67 19; wind N. E.; course, E. by N.

August 6.—Lat. 43 13, lon. 65 1; wind N.; course, E. by N.

August 7.—Lat. 44 34 lon. 63 36; wind S. W.; course, E. by N. half N.

August 8.—Off Beaver Island light; becalmed in fog.

August 9.—Lat. 45 9; off Camp Canso; calm

THROUGH THE STRAITS OF BELLE ISLE.

It is intended to sail across the Gulf of St. Lawrence and through the Straits of Belle Isle, for thus we hope to save time and be rid of much bad weather.

Although it is now a week since we left port we have missed nothing essential from the equipment. The vessel meanwhile has behaved splendidly, and the crew have shown themselves to be composed of good working material.

In the scientific department work has also advanced,

though more slowly, since it has been thought inexpedient to place the instruments. A bird of a rare species has been obtained. All of us are hopeful of success.

Very respectfully,

GEORGE E. TYSON, (off Cape Canso.)

On the 22d of November, the following letter was received from the hardy navigators:

NIUNTILICK HARBOR, CUMBERLAND GULF,

September 29, 1877.

Captain H. W. HOWGATE,
United States Army, Washington, D. C.

DEAR SIR: After a long and tedious passage of forty days we reached our present harbor on the 13th of September, and I avail myself of the first whaler returning to Scotland to communicate with you and our friends at home. I do not find matters here as I had hoped, owing to the presence of a large number of whalers and but few natives. This will make great competition for the trade of skins and other material, and compel us to pay higher prices than would otherwise have been the case. To avoid this I would have gone to another harbor had it been a little earlier, but now it is too late to attempt a change. * * * I shall soon move the vessel into winter quarters at the head of the gulf, where I hope to be more successful.

* * * * * * *

HEALTH OF THE CREW.

The health of the men continues excellent and our supplies prove of good quality and in abundance. All feel confident of making the expedition a profitable one, even if we should fail in collecting all the stores called for in your instructions. But we shall endeavor to accomplish all you could wish us to do.

WORK OF THE EXPEDITION.

Mr. Sherman has got fairly at work making observations, and has obtained some good photographs of whaling and native scenes. Mr. Kumlein is busy, and is adding to his collection constantly, although a little disappointed at finding the number of rare specimens fewer than he had expected to find them. It is yet too early to say how we shall fare, but when the first feeling of homesickness wears off

and the men recover from the strain of the long voyage, matters will look brighter to them, and they will work with renewed energy.

With good wishes to you and to all our friends at home, I remain, with great respect,

GEORGE E. TYSON.

APPENDIX.

PLAN FOR THE EXPLORATION OF THE ARCTIC REGION.

[A paper prepared by Captain H. W. Howgate, U. S. A., and read at the meeting of the American Geographical Society, in New York, January 31, 1878.]

The plan of Arctic Exploration and Discovery, in furtherance of which I have the honor of appearing before you this evening, is one to establish a colony of hardy, resolute, and intelligent men at some favorable point on or near the borders of the Polar sea, and providing it with all modern appliances for overcoming the physical obstacles in the pathway to the Pole, and for resisting the effects of hunger, of cold, and of sickness, to deprive it of the means of retreat, except at stated periods of time. The location selected as the site of the proposed colony is on the shore of Lady Franklin Bay, near the seam of coal found by the *Discovery* of the English expedition of 1875.

The idea of establishing such a colony is not a new one, as it was advocated by Dr. Hayes as far back as 1862, and has since that date been approved by this society and by the action of foreign societies and explorers. This fact accounts, in great part, for the almost unanimous support with which the so-called Howgate plan has been received.

The results of the last English expedition, and modern improvements in means of locomotion and communication, render it possible to locate farther north than in the earlier days of Arctic exploration, when sailing vessels were used.

The expedition of Captain Hall in the *Polaris* in 1871, and of Captain Nares in the *Alert* and *Discovery* in 1875, have shown that, by the use of steam, it is a comparatively easy matter to reach the entrance to Robeson's channel in latitude 81° north, and that the serious difficulties to be over-

come lie beyond that point. Parties from these two expeditions have made fair surveys 140 miles north of this point, leaving about 400 miles of unexplored regions between it and the goal of modern geographers—the Pole.

When Captain Hall reached the upper extremity of Robeson's channel the lookout of the *Polaris* reported open water in sight and just beyond the pack which surrounded the vessel and impeded further progress. This open water was afterwards seen from the cape at the northern opening of Newman's bay, and it was the opinion of the crew of that ill-fated vessel, that if she had been but the fraction of an hour earlier in reaching the channel, they could have steamed unobstructed to the Pole itself, or to the shores of such lands, if any exist, as may bound the so-called open Polar sea. We know that they did not succeed, but were forced to winter almost within sight of this sea, and subsequently, disheartened by the loss of their gallant commander, abandoned the enterprise.

Where this open water was found, Captain Nares, in 1875 and 1876, found solid, impenetrable ice, through which no vessel could force its way, and over which it was equally impossible for sled parties to work.

These facts appear to show that within the Arctic circle the seasons vary as markedly as in more temperate southern latitudes, and that the icy barriers to the Pole are sometimes broken up by favoring winds and temperature. To get further north, or to reach the Pole, prompt advantage must be taken of such favoring circumstances, and to do this with the greatest certainty and with the least expenditure of time, money, and human life, it is essential that the exploring party be on the ground at the very time the ice gives way and opens the gateway to the long sought prize, fully prepared to improve every opportunity that offers.

The permanent colony should be furnished with provisions and other necessary supplies for three years, and should consist of at least fifty selected men, mustered into the service of the United States, three commissioned officers, and two surgeons, all to be selected with a view to their especial fitness for the work—young, able-bodied, resolute men, who can be depended upon to carry out instructions to the extreme limit of human endurance. An astronomer and two or more naturalists, to be selected by the National Academy of Sciences, and to work under instructions from that body, but subject to such general supervision and directions from

the head of the expedition as is customary at all posts in charge of an officer of the United States, should accompany the expedition. One or more members of the regular force should be competent to make meteorological observations, and to communicate by telegraph and signals whenever such communications become necessary. An annual visit should be made to the colony to carry fresh food and supplies; to keep the members informed of events occurring in the outside world, and bear them news and letters from anxious relatives; to bring back news of progress made and of a private character to friends; also, if necessary, to bring back invalided members of the expedition, and carry out fresh colonists to take their places. In this way the morale of the colony would be maintained, and the physique of its members kept constantly at the maximum, and the knowledge that this annual visit would be made would do much to alleviate the discomforts of the long Arctic night, and the feeling of isolation so graphically described by Arctic explorers.

Captain Hall spent eight years among the Esquimaux, and each year found himself better fitted to withstand the severity of the Arctic circle, and the colony would, it is believed, in like manner become acclimated, and eventually succeed in accomplishing the long sought end.

With a few strong, substantial buildings, such as can be easily carried on shipboard, the members of the colony could be made as comfortable and as safe from atmospheric dangers as are the men of the Signal Service, stationed on the summits of Pike's Peak and Mount Washington, or the employés of the Hudson's Bay Company, stationed at Fort York, or elsewhere, where a temperature of —60° is not uncommon.

A good supply of medicines, a skillful surgeon, and such fresh provisions as could be found by hunting parties would enable them to keep off scurvy and maintain as good a sanitary condition as the inhabitants of Godhaven, in Greenland. Game was found in fair quantities by the *Polaris* party on the Greenland coast, and by those from the *Alert* and *Discovery*, on the mainland to the west, especially in the vicinity of the lastnamed vessel, where fifty-four musk oxen were killed during the season, with quantities of other and smaller game. The coal found by the *Discovery's* party would render the question of fuel a light one, and thus remove one of the greatest difficulties hitherto encountered by Arctic voyagers.

There seems to be little doubt that Lady Franklin Bay can be annually reached by a steam-vessel, as Captain Hall went as high as Cape Union, between latitude 82° and 83° with the *Polaris*, and Captain Nares still higher with the *Alert* It is possible that the last named point may be reached with the vessel, in which case coal and provisions could be deposited there to form a secondary base of operations for the exploring party. If this latter can be done, the road to the Pole will be shortened by about ninety miles in distance, and three weeks or more, in time—two very important items. It should be clearly understood, that the only use to be made of the vessel which it is hoped to obtain from the Government, is in the transportation of the men and supplies to the location of the colony. When this is done, the vessel will return to the United States and await further instructions. To the expeditionary corps brought from the United States should be added a number of Esquimaux families to serve as hunters, guides, &c., and also an ample number of Esquimaux dogs, so indispensable for sledging, and so useful as food when their capacity for work is gone.

The colony should be kept under the strictest discipline, and to this end should be formally enrolled in the military service, save, perhaps, the strictly scientific members. By discipline only can such control be exercised as will be indispensable to the successful prosecution of the work. One cannot read without pain, the account of the *Polaris* expedition, where the bonds of discipline, only too loose before Hall's untimely death, were entirely relaxed after it. The first in command of the new expedition should be a man able not only to gauge men, but to control them, and his second should be like unto him. Enthusiasm and energy are desirable, but coolness of temper, firmness of rule, persistency of purpose, and a well balanced mind, fertile in resources and expedients, are indispensable to success.

The outfit of the expedition should include, among other things, an ample supply of copper telegraph wire to connect the colony at Lady Franklin Bay with the subsidiary depot at Cape Union, and thence northward, as far as practicable. Copper wire is strong, light, flexible, and a good conductor, and can be worked while lying upon the dry snow or ice without support. The necessary battery material and instruments should be taken to equip the line, and the battery left permanently at the bay station, where, fuel being abundant, it could be kept from freezing. A special form of instru-

ment has been devised for the expedition, by which the use of battery is dispensed with entirely, and it is possible that the recently discoverd telephone may be applied to advantage. It should certainly form a part of the outfit. Much attention has been given to the possible use of balloons as a means of observation and, perhaps, of exploration. I am now in correspondence with distinguished aeronauts in this country and in France upon the subject, and a series of experiments has been instituted to determine the practicability of obtaining a suitable material for the covering of the balloons that will resist low temperature. Here, as elsewhere, the coal mine plays an important part, as by its aid the necessary supply of gas can be readily and quickly procured.

A few sets of signal equipments, such as are used in the army Signal Service, would also form an important part of the outfit, and all of the men should be instructed in their use, and in the Signal code. Thus provided with means of communication, parties could move forward with confidence, as they would be able, when necessary, to call upon their comrades, who remained behind, for advice or assistance. The existence of coal at the *Discovery's* winter quarters determines the question of colonization and the location of the colony as a means of Polar exploration; and the Nares expedition would have been a success if it had done nothing more than this. The failure of his admirably equipped expedition to reach the Pole is, in a great measure, attributable to the abnormally cold season and the exceptional character of the winds, which had resulted in the formation of ice ridges running across the line of march, thus making progress difficult, slow and dangerous. It is reasonable to suppose, from past meteorological records, that these unusual conditions will not exist during the present season, and, indeed, may not occur again for several years. Instead of discouraging further effort, the result of Nares' expedition, from the causes named, should stimulate fresh endeavors, and hold out a fair prospect of success. In any event, the little colony on Lady Franklin Bay during their three years' residence, besides having the opportunity of selecting an open season, and becoming thoroughly hardened and acclimated, would have their work narrowed down to a common focus—the pathway due north. The work of the Nares expedition clears the way for the final solution of the Arctic problem.

To carry out the plan thus briefly sketched, it is desirable to secure the use of a government vessel, and, inasmuch as its object is one of national interest, such other Government aid as might be necessary and proper; and, accordingly, a bill to "authorize and equip an Expedition to the Arctic Seas" was introduced in the House of Representatives January 8th, 1877, by Mr. Hunter, of Indiana, and referred to the Committee on Naval Affairs, from which it was favorably reported by Mr. Willis, of that committee, February 22d, 1877. In the Senate the same bill was introduced by Mr. Dawes, and referred to the Committee on Naval Affairs, February 9th, 1877. The pressure of other and more important business then occupying the attention of Congress and of the nation, prevented further action during the session, which closed on the 3d of March last. The subject was found, however, to be one of national and universal interest, and received the hearty commendation and support of former Arctic explorers, of geographers, and of men eminent in the several walks of science, among whom I may name the distinguished President of this Society and the Hon. I. I. Hayes, both of whom have from the first given me their warmest encouragement and the benefit of their wide experience. Professor Joseph Henry, of the Smithsonian Institute, Professor Elias Loomis, of Yale College, President Potter, of Union College, Admiral Porter, of the Navy, the then Secretary of the Navy, and most of the officers and crew of the *Polaris*, with many others, have given the weight of their names and influence in support of the enterprise in this country, while abroad I have abundant evidence of interest from members of former expeditions, notable among whom are Dr. John Rae and Captain Kennedy, of English fame, and Lieutenant Payer, of the Austro-Hungarian Expedition.

As practical evidence of the interest felt in the subject in this country, a number of public spirited and generous citizens, among whom, it is a pleasure to state, those of this city occupy the foremost place, having faith in the success of the Colonization plan as a means of Arctic exploration, and believing in its ultimate approval by Congress, contributed from their private means a sufficient sum for the purchase and outfit of a small vessel to be sent to the Arctic seas for the purpose of collecting such supplies during the ensuing winter as might be useful for the main expedition of 1878, if that expedition should be authorized. It was at first in-

tended to limit the mission of this vessel to the collection of material only, but the opportunity for scientific investigation was so inviting, and the added cost incurred thereby so very trifling in compasison with the results to be attained, that space was made on board for two observers and their necessary apparatus. One of these observers was selected on the recommendation of Professor Elias Loomis, of Yale College, and instructed to pay especial attention to meteorological phenomena while the other was selected as naturalist of the expedition by Professor Spencer F. Baird, of the Smithsonian Institute, from whom he received special instructions.

This vessel, the *Florence*, sailed from New London August 3d, with a crew of thirteen men, all told, commanded by Captain Tyson, of "*Polaris*" fame, and reached the head of Cumberland Gulf on September 13th, where she has gone into winter quarters. Captain Tyson's instructions are to collect such supplies as his experience shows to be necessary for the use of the future colony, and to join the vessel carrying the members of the Colony at Disco in August next, and in the event of its non-arrival, to return to the United States.

There is reason to hope, from the knowledge and attainments of the two scientific gentlemen accompanying the *Florence*, that the little vessel will, on her return, add no small quota to our knowledge of Arctic cosmogony and phenomena. But however that may be, her loss or safety must remain a closed book to us for many months to come. What perils she may meet, what dangers dare, what obstacles overcome, we can neither know nor forecast, but she and her gallant crew are none the less in the hands of Him who rules the ice bound waste as surely as He rules this crowded city, and without whose paternal knowledge not even the sparrow falls.

To guard against possible delay, in the event of Captain Tyson's failure to reach Disco at the proper time or without proper supplies, the Danish Government has been requested to delay the shipment of furs from that point until the middle of August, in order that a supply may be purchased from that source if necessary.

As soon after the opening of the present session of Congress as practicable, the bill to authorize the expedition was offered in the Senate and House of Representatives, and in both referred to the Naval Committee. The House Com-

mittee, through Mr. Willis, of New York, who from the first has been an active friend of this measure, has renewed its favorable report of last session, and the bill is now awaiting the final action of the House upon it. From the Senate Committee I have the assurance of a favorable report. Senators Sargent and McPherson, having immediate charge of the bill, have exhibited a gratifying interest in its success, and it is reasonable to hope for its final passage.

In Paris, M. de Fonvielle, who is well known as an accomplished aeronaut and man of letters, is making a series of balloon experiments for the benefit of the future colony, in the foundation of which he takes a lively interest, and the French Geographical Society, at its last regular session, formally expressed its approval of the plan. The Bremen Geographical Society, through its Secretary, Dr. Lindeman, had previously expressed a similar approval, and everything seems working favorably toward the accomplishment of the desired end; even the mighty forces of nature and the changeful seasons appear to labor for the success of the expedition, for the present winter, of such unprecedented mildness, will undoubtedly retard the formation of ice in the Polar basin, and leave a freer passage for the Colony next summer up Baffin's Bay to Kennedy and Robeson's Channels. The great veteran explorer, Professor Nordenskiold, and the favorable reports which he brings back with his expedition just returned, with the wonderful voyage of Captain Wiggins from the mouth of the Yenessei along the Siberian coast and through the Kara Sea, all demonstrate that the open season has unsealed the ice of higher latitudes, and points to a favorable northward passage during the coming summer.

I have not touched this evening upon the vast interest to science which Polar expeditions represent, and the important questions which they alone can solve, nor upon the geographical theories and arguments in support of the different routes that might be followed, preferring to leave the settlement of these subjects to more competent hands. The noble Earl who honors us with his presence this evening, and who has won distinction in Arctic fields as well as in those of statesmanship, and Dr. Hayes, whose triumphs as an explorer have been supplemented by those accorded to the successful legislator, can tell us with the graphic tongue of eyewitnesses, the wonders of the strange lands we seek to colonize, and whose hidden secrets we seek to solve; for

both have watched the colossal or fairy shapes of mountainous icebergs with their changeful play of hues under the midnight sun, or the mighty arch of the Aurora, with its trailing fringes of incandescent colors spanning through the long night of Arctic winter, the mystic sea of ice and silence. Their presence, and that of the other distinguished gentlemen who are announced to address us, and whose names are as familiar as household words wherever the English language is known or spoken, I hail as an augury of success, and I heartily join with them and you in doing honor to the name and achievements of our countryman Stanley, in penetrating the wilds of Africa. There is no city throughout the whole broad Union more suitable for such a meeting as the present, a city where the memory of Grinnell, the great and public spirited merchant, is still green, and where so many others, their hearts as generous as their means were large, have given freely of their store to aid in Arctic discovery and in whatever else was good and noble in art and science, in love and charity.

In closing, permit me at present to thank you all for your attention and your kindly manifestation of interest in the subject, and to hope that such action will be taken by Congress as will invest it with added interest in the near future.

CAPTAIN SHERARD OSBORNE ON POLAR EXPLORATION.

WASHINGTON, D. C., *February* 13, 1878.

HON. BENJAMIN A. WILLIS,
Committee on Naval Affairs,
House of Representatives.

SIR: As a matter of interest in connection with the subject of Arctic exploration, I have the honor to invite your attention to the following extracts from the proceedings of the Royal Geographical Society of Great Britain, at its meeting of January 23, 1865, when a paper on the exploration of the North Polar Region was read by Captain (now Admiral) Sherard Osborne, R. N. I invite your especial attention to these extracts as bearing directly upon the proposed

useful employment in time of peace of a portion of the navy for purposes of scientific and geographical exploration, which constitutes the essential feature of the plan embodied in the bill to authorize an expedition to the Arctic seas, now pending in the Naval Committee.

What is here said about the British navy applies with equal force to our own at the present day. Many of our ships are resting idly, either in our ship yards at home or rotting at anchor in foreign harbors, and our officers and seamen are becoming enervated from the want of a proper stimulus to their ambition. The small amount asked for in this bill could, in my opinion, be wisely spared from some one of the regular appropriations, and come back to the country a thousand fold in the improved morale of the gallant officers and men who would gladly avail themselves of such an opportunity of earning personal distinction, and at the same time of doing honor to their country.

All that is needed, in addition to the money asked for, to equip the expedition, is the authorized use of one of these idle vessels and its crew to serve as a transport for the colony to the scene of action—making one voyage each year—and the authorized employment on this duty of fifty persons, whose compensation is already provided for in the several departments from which they would be detailed, and from which their services could be spared for the required period without detriment to the public service.

In view of the great value of the geographical and other scientific results to be reasonably hoped for from such an expedition, it does not seem that there should be any hesitation in acting favorably upon the subject, and at an early date.

Very respectfully,
Your obedient servant,
H. W. HOWGATE.

At the meeting of the Royal Geographical Society, January 23, 1865, Captain Sherard Osborne read a paper on the "Exploration of the North Polar Region," from which the following extracts are made:

* * * * * * *

"An exploration of the Polar area should always be sent under official auspices and official discipline. I have no faith

in purely private expeditions on such a service as this I advocate. We need all the resources of a naval dock-yard; all the especial knowledge collected in various departments, whether in the preparation of vessels, food, raiment, sledges, or equipment to insure the work being well and safely done. Wooden ships of war are now rotting and sinking at their anchors in our arsenals; all the old ladies around our sea-ports are cooking their tea with heart of oak from poor chopped up gun boats.

* * * * * * *

"But I have no doubt men of science, men who think the navy and its officers and sailors exist for nobler purposes than to slay or be slain, will find the First Lord of the Admiralty just as amenable to reason and healthy pressure as former First Lords have been. The Admiralty will, as good servants of the public, do whatever the public calls upon them to do; and it is by the action of public opinion, directed by the men of science in this country, that I hope to see a Polar expedition sent forth in this generation under official auspices. The navy needs some action to wake it up from the sloth of routine, and save it from the canker of prolonged peace. Arctic exploration is more wholesome for it, in a moral as well as a sanitary point of view, than any more Ashantee or Japanese wars. You are not going to educate us, work us up to the point of nautical perfection, awaken hopes and ambition, and then give us oakum to pick, or run us over the masthead after top-gallant yards to keep down the spirit which intellectual progress has evoked. The navy of England cares not for mere war to gratify its desire for honorable employment or fame. There are other achievements it knows well, as glorious as a victorious battle, and a wise people should be careful to satisfy a craving which is the life blood of a profession.

"Upon these grounds, as well as those of scientific results, would it be too much to ask for a fraction of the vast sum, yearly sunk in naval expenditure, for two small screw vessels, and one hundred and twenty officers and men, out of the fifty thousand men annually placed at the disposal of the Admiralty?

* * * * * * *

"Of the advantages to be derived from an exploration of the Polar area: In the first place there is an unknown area of 1,131,000 square miles of the globe's surface a sheer

blank. Within that area we are profoundly ignorant whether there be lands or waters; whether, as some say, it is a silent frozen solitude, or an open sea teeming with animal life. So far as it has yet been explored in that direction the land has been found capable of supporting not only animal but human life.

* * * * * * *

"To botanists, therefore, as well as geographers, there is everything to be discovered within the Polar area, and not only the botany of the land, but that of the sea and of the fresh water, lakes, and rivers flowing from the glaciers of that ice-bound region."

* * * * * * *

The following extracts are from the remarks made upon Captain Osborn's paper by members of the Society:

Sir Roderick Murchison, President of the Royal Geographical Society said:

"Let us not weaken the dignity of our calling by any endeavor to show the *cui bono* of such an expedition by the hope of obtaining profitable commercial results, since it is quite enough for us to be assured that the scientific objects to be obtained are well worthy of the effort. I trust, therefore, that, as British geographers, you will feel with me that it specially pertains to our nation, which by the conduct of its bold and skillful voyagers has delineated on the map of the world, the outlines of land and water over so large an area of the Arctic regions, to complete these grand surveys, by an endeavor to hoist the Union Jack at the North Pole itself."

The President also read the following extract from the writings of Sir John Barrow, for many years Secretary of the Admiralty:

"The *physical* power of the navy of England has long been duly appreciated at home, also by most foreign nations, and is matter of public record; its *moral* influence, though less the object of publicity, requires only to be more extensively known to be equally felt and esteemed; and nothing can be more conducive to this end than the results to be derived from voyages of discovery whose great aim has been the acquisition of knowledge, not for England alone, but for the general benefit of mankind. But it may be asked *cui bono* are these northern voyages undertaken? If they were merely to be prosecuted for the sake of making a passage from England to China, and for no other purpose, their utility

might fairly be questioned. But when the acquisition of knowledge is the ground work of all the instruction under which they are sent forth; when the commanding officer is directed to cause constant observations to be made for the advancement for every branch of science—astronomy, navigation, hydrography, meteorology, including electricity and magnetism—and to make collections of subjects of natural history; in short, to lose no opportunity of acquiring new and important information and discovery; and when it is considered that these voyages give employment to officers and men in time of peace, and produce officers and men not to be surpassed, perhaps not equalled, in any other branch of the service, the question *cui bono* is readily answered in the words of the minister of Queen Elizabeth, "Knowledge is power."

General Sabine, President of the Royal Society, said, "he was particularly impressed by what had been said with regard to affording to the officers of the navy an opportunity of enterprise and distinction in a time of peace, and he knew no better field for their exertions than explorations in the Arctic regions. Many of our most distinguished officers in the navy had been trained in that school. It was not to be supposed that in the present day, when the interest in geographical, and in all the physical sciences, has so much increased, that so large a portion of the globe, lying almost at our hands, should remain unexplored."

At the meeting of the Royal Geographical Society, April 10, 1865, the president, Sir Roderick Murchison, said: "I will not deign to contract the feeble and irrelevant argument put forth by timid persons as to the danger to be incurred by polar navigators, for surely the British navy has not come to the condition, that with their present great means and appliances, they cannot emulate and surpass the efforts of Hudson and our earliest voyagers in their little cock boats. If there were great danger to be encountered in this projected expedition, it would, indeed, be only an additional stimulus to our brave seamen; but, as a matter of fact, there have been fewer losses of life in the Arctic or Antarctic seas than other quarters of the globe over which sailors are bound to roam."

[A copy of the above communication was also addressed to Hon. A. A. Sargent, Chairman of the Naval Committee of the Senate.]

ACTION OF SCIENTIFIC ASSOCIATIONS.

AMERICAN GEOGRAPHICAL SOCIETY.

On the evening of January 31, 1878, the American Geographical Society had under consideration the Colonization plan of Arctic exploration, and gave a reception to the Earl of Dufferin, Governor General of Canada. The following account of the proceedings on the occasion is taken from the New York *Tribune* of February 1st:

Between five and six hundred persons were present including many ladies. At 8:20 o'clock, Chief Justice Daly appeared on the platform with the Earl of Dufferin, and they were followed by William Cullen Bryant, Bayard Taylor, Dr. I. I. Hayes, Lieutenant Greeley and Colonel William Ludlow, U. S. A., General George W. Cullum, Professor T. Sterry Hunt, Albert Bierstadt, Professor W. Wright Hawkes, Walton W. Evans, Francis A. Stout, Colonel C. C. Long, Chief Justice Curtis, Harlow M. Hoyt, Professor James J. Gardner, Luther R. Marsh, Samuel Sloan and William Remsen. Addresses were made by Chief Justice Daly, William Cullen Bryant, Bayard Taylor, the Earl of Dufferin, Dr. Isaac I. Hayes and Lieutenant Greeley, of the Signal Service, who spoke for Captain Howgate, in the latter's absence.

Chief Justice Daly stated that the meeting was convened to consider Captain Howgate's plan for the exploration of the Arctic regions. They were honored with the presence of the Earl of Dufferin, Governor-General of Canada, himself an Arctic explorer, and the author of one of the most sprightly and pleasant books that has ever been written on travel in the high latitudes. Chief Justice Daly then proceeded to answer the doubts of those who could not understand the value of Arctic exploration. He said that if nothing more was to be accomplished than the geographical feat of reaching the Pole, it would be very difficult to answer such doubts, but that the general answer to them was that there is no portion of the earth's surface where observation in respect to scientific matters affecting the whole globe is so important as in the Polar basin or its vicinity. When Arctic expeditions are talked of for the acquisition of scientific knowledge, there are many who want to know in advance what the practical results will be, and who are apt to exclaim, "Well, what are the uses of it?" The best answer

to such was that of Dr. Franklin, when he was asked of what value was his discovery that electricity and lightning were the same—"What is the use of a child? Make it of use." Most of the advantages of our present civilization owe their origin to what in its day was scientific information, gathered by the close observation and patient labors of men who could not then have predicted the great results that have followed from their researches.

Lieutenant Greeley was then introduced, and stated that he was present to represent Captain Howgate, who had been unexpectedly detained in Baltimore. He read the paper which Captain Howgate had prepared, and which is given in full in another part of this appendix.]

MR. BRYANT'S ADDRESS.

William Cullen Bryant was next introduced, in a pleasant manner, by Judge Daly, and said:

I take for granted that no very direct commercial advantages are expected from exploring the region to the north of that domain over which the honored guest of the evening exercises the viceregal power, nor that even the enterprise of Dr. Hayes, fertile as he is in expedients and hopeful in temperament, is likely to find in that quarter a safe and practicable path to the coast of northeastern Asia. But while commerce withdraws from the undertaking, science comes forward and takes upon herself the office of discovery. While one party of explorers are penetrating to the heart of the African continent, and threading the rivers and measuring the lakes that stagnate under the equator, we are to send out from this quarter a party to the Arctic circle, where human life can exist only through a constant battle with the elements; a party to establish an outpost in what we may call the enemy's country, a post of observation from which science may make excursions and gather facts for future use. What we are about to do may be compared with the conduct of one who inhabits a palace, and who, after taking an inventory of the lower rooms, resolves upon ascending to the attic and seeing how the rooms in that quarter are furnished.

It is hardly worth while to discuss beforehand what will be the value of the observations about to be made by science in the region of which I speak. Small beginnings in science often lead to great results. He who first observed the properties of the loadstone, who saw it attracting the

particles of iron from loose sand and clinging to rocks that contained iron ore, could have had no idea of the vast and almost immeasurable advantage which the navigator of the sea would derive from it when it should be applied to his use in the mariner's compass. When the laws of the electric fluid were first investigated, who was there that thought of the wonderful uses to which it might be put when tamed and taught to carry messages from pole to pole with the speed of light, and even to repeat the words and musical tones uttered over the wires on which it was running? Who thought that it could be taught to write, or to speak, and sing? * * *

So will it, perhaps, be with the discoveries made by those who observe the aspects and agencies of Nature within the Arctic circle. The mystery of the magnetic pole is to be solved. The phenomena of the atmosphere and of light in that region are to be observed and recorded. That beautiful meteor called the northern lights is to be observed in its birthplace and made to disclose its causes. The individuals of the animal and vegetable kingdom such as exist in the waters or on the coasts of that desolate region are to be made the subjects of familiar observation and every particular relating to them duly recorded. What will be yet done with the facts thus gathered? Who shall say to what conclusions they may lead, or what secrets of nature they may open up to our view? It is said that necessity is the mother of invention, but quite as true is it that knowledge supplies invention with its materials, and that without knowledge invention only gropes and stumbles in the dark.

BAYARD TAYLOR'S ADDRESS.

At the conclusion of Mr. Bryant's address, Bayand Taylor was introduced and spoke as follows:

Mr. Chairman: I have been requested to discharge the honorable duty of calling the attention of the members of the Geographical Society to the presence here, this evening, of a gentleman whose distinguished position is not the only stamp of his many abilities. As the executive head of the great Dominion which nobly emulates us in carrying an unbroken belt of civilization from sea to sea, the Earl of Dufferin has a special claim to our welcome. In a political sense, we acknowledge him as the best of neighbors; and certainly no one of his predecessors has ever so frankly and cordially mingled with us in a social way. On this occa-

sion, however, it is proper that I should chiefly dwell upon those qualities of his mind, and those features of his experience, which claim recognition from this Society. When we welcomed Dom Pedro II., a year and a half ago, it was not the monarch alone whom we received; it was also, without doubt, the most energetic and untiring traveler of this or any other age. Lord Dufferin is the only Governor General who has personally visited every settled portion of the Dominion; and, in order to accomplish this, he has rivaled the Emperor of Brazil in the extent of his journeys, without going outside of Canadian soil. He has been trained, by his former travels in the far North and the Orient, to appreciate the vast difference between hearsay and personal knowledge—a difference which enters into the secret of successful political rule. The power of observing clearly, correctly and rapidly—I might almost call it the perceptive instinct—is not an ordinary gift; but it is one which Lord Dufferin possesses in an eminent degree. When I visited Iceland in the Summer of 1874, my first impressions of the scenery immediately recalled his descriptions to memory. The transparency of the atmosphere; the exquisite effects of color; the faint, delicate, and, as he truly says, "gem-like purity" of the mountain outlines were all there. No previous traveler mentions them—yet they are the leading characteristics of Iceland scenery. There can be no better test of description than the fact that the objects themselves suggest the author's words. During the same voyage Lord Dufferin passed beyond the field of travel, and fairly entered that of exploration. He is the only one present to-night, who has seen Spitzbergen and Jan Mayen's Land; in fact, he is one of some half-dozen living men who have landed on Jan Mayen's Land, and stood on the base of that wonderful peak, nearly 7,000 feet in height, which feeds the lonely sea from its five broad torrents of descending ice. It is fitting that we should tender to him such appreciation as lies in our power; and I therefore move, Mr. Chairman, that his Excellency, the Earl of Dufferin, Governor General of the Dominion of Canada, be elected an honorary member of the American Geographical Society.

SPEECH OF LORD DUFFERIN.

Lord Dufferin was unanimously elected an honorary member of the Society, and when he stepped forward to speak he was heartily applauded. He said:

Mr. President, Ladies and Gentlemen: In rising to respond to the very kind observations which have been made in my regard upon this occasion, I confess that my mind is disturbed by conflicting considerations. On the one hand I feel that I have not the least professional right or title to intervene in the present occasion. On the other, I should be very sorry if I had not an opportunity of expressing to you how very deeply I feel the kind reception which has been extended to me on the present occasion. It is true some years ago I sailed toward the North and got as near to the Pole as Washington is to Ottawa, but my voyage was as fruitless as the journey of the Peri to the gates of Paradise, and it had but one feature in common with more serious explorations, namely, that I had to turn back again. [Laughter.] But neither, indeed, was that journey of any use to science, nor was it fertile in personal adventures. All that I can claim is that I was able to establish the temperature of the sea in a certain section of the Arctic Ocean which had never been explored by any vessel.

But at all events there is one capacity in which I feel I have a right to claim admission to these halls, and that is as a member of the Geographical Society of London. [Applause.] Now we all know that geographers are brothers all the world over. To a geographer these lines of ethnological and political demarcation which divides nations do not exist. All countries to him are what Italy was once described as being—merely geographical expressions. [Laughter.] The only heroes to whom he gives a place upon his roll of fame, the only careers which he admits upon his calendar, are those noble spirits who, generation after generation, have braved privation and faced danger and even death in order that they might advance the cause of science, and point the way to their fellow men to those secret lands and unknown regions of the earth which God has prepared from everlasting for the habitation and advantage of the human race.

It is, therefore, ladies and gentlemen, as a brother geographer only that I venture to address you, and I can assure you that we in England duly appreciate the efforts which have beeen made by this society for the advancement of geographical knowledge. And we fully comprehend that if in any place on the face of the earth enterprise should be regarded and honored, it is on that continent which owes its discovery and its present glorious condition to the enter-

prise of the greatest navigator that ever furled a sail or took a bearing. [Applause.] Nor is it necessary that I should assure you that the names of those navigators whom America has sent forth—the names of Kane and Hayes and Hall—are as familiar and are as completely household names to us as are those of Franklin, McClure and Belcher among you. And I am proud to think that the two great representatives of the Anglo-Saxon race have been so intimately associated in a common endeavor both to explore the mysteries of the Arctic Ocean, and, as I may now add, the resources of Central Africa.

But I feel that it is not in that capacity that I am really among you to-night. You will all remember that when Columbus, to whom I have referred, returned from his great discovery he brought back with him, in chains, certain of the chiefs of the nations with whom he had come in contact, both as proofs of the truth of his narratives and as specimens of the strange nationalities he had discovered. Our discussion to-night has been concerned with those snow covered lands which lie beneath Arcturus, and are lighted with the radiance of the Aurora. And I do believe that, if I am paraded before you to-night, it is because my friend, Judge Daly, wished to show to you a potentate whose sceptre touches the Pole, and who reigns over a larger area of snow than any other monarch of the earth. [Laughter and applause.] But, ladies and gentlemen, here the comparison concludes, for you all remember that as soon as these unfortunate prisoners were brought into the presence of the gentle Queen, Isabella, she commanded their fetters to be struck from their limbs; but the fetters with which I am bound here have been forged by the kindness and hospitality and consideration of the American people wherever I have traveled through the States, and I fear that even your imperial mandate would fail ever to lose those chains.

Dr. I. I. Hayes, the Arctic explorer, said he had given proof of interest in the meeting by coming from the Arctic region, in other words Albany, to attend it, but did not wish to be held responsible for the Arctic storm which he had brought along with him. A large and clearly defined map of the Arctic Zone was suspended at the rear of the platform, and Dr. Hayes, taking a pointer, led his auditors on an interesting voyage to all the points touched by every Arctic expedition since Sir John Franklin's. Dr. Hayes affirmed his strengthened belief in the existence of an open Polar

Sea, and gave his reasons therefor. He explained the idea of a Polar Colony, which Dr. Hayes declared deserving of the support of Congress.

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MARYLAND ACADEMY OF SCIENCE.

The following resolutions were unanimously adopted by the Maryland Academy of science on Monday, February 19, 1877.

Whereas, This Academy has for its object the encouragement of science, whether abstract or applied; and

Whereas, There is now pending before Congress a bill to authorize and equip an expedition to the Arctic seas; and

Whereas, This Academy has been informed of the means to be adopted by, and of the results which are expected from the expedition;

Therefore be it Resolved, That we cordially approve of the plan proposed, believing, as we do, that it is the one best calculated to lead to successful result, not in abstract scientific knowledge alone, but also in such scientific knowledge as will be readily utilized for the benefit of commerce.

Resolved, That we earnestly and respectfully urge upon Congress the passage of the bill.

Resolved, That the Secretary be directed to forward a copy of these resolutions to our Senators and Representatives in Congress, and request the careful consideration of the bill.

—

FRANKLIN INSTITUTE.

HALL OF THE FRANKLIN INSTITUTE,

PHILADELPHIA, *February* 26th, 1877.

The following preamble and resolution was adopted at a meeting of the Franklin Institute, held February 21st, 1877:

Whereas, A bill is at present pending before Congress asking aid for carrying into execution the scheme of Capt. H. W. Howgate, of the Signal Service, for reaching and exploring the region about the North Pole on the plan of colonization,

Resolved, That the Franklin Institute approve of this

plan, not only for its economy, but for its efficient practicability, and believe it to be the most feasible plan yet offered.

J. D. KNIGHT, *Secretary.*

On motion, the Secretary was directed to transmit a copy of the above preamble and resolution to Congress.

[Presented in Senate March 2, 1877, and referred to Committee on Military Affairs.]

CINCINNATI SOCIETY OF NATURAL HISTORY.

To the Senators and Members of the Forty-fourth Congress:

The Cincinnati Society of Natural History respectfully represents to the honorable Senators and Members of the Forty-fourth Congress the importance of further and more successful Arctic exploration. In all the various branches of science are found important problems which can be definitely settled in the Polar regions only. The geography of that region is undecided. Hydrography and meteorology, two branches of science in which the United States are already pre-eminent, and a more complete and thorough knowledge of which is imperatively demanded by the ever enlarging interests of science, and of commerce, can nowhere be definitely settled but in the Arctic Zone. The laws of gravity are still uncertain, and can be decided only in the vicinity of the North Pole. Mineralogy, geology and all the branches of natural history still largely depend upon a thorough exploration of the Polar regions.

This society, therefore, in the interest of science, and for the honor of our country, respectfully recommends favorable legislation on the subject of Polar exploration; and convinced that colonization is the most practicable way of conducting an expedition of this nature, recommends the passage of the bill to authorize and equip an expedition to the Arctic seas, now in the hands of the Committee on Naval Affairs.

The above memorial was unanimously adopted at a full meeting of the Cincinnati Society of Natural History, held Tuesday evening, February 6, 1877.

J. F. JUDGE,
Recording Secretary.

[Presented in House of Representatives February 10, 1877, and referred to Committee on Naval Affairs.]

FORTNIGHTLY CLUB OF MILWAUKEE.

Whereas, A bill has been introduced into Congress appropriating funds to aid and maintain a scientific expedition in the northern Polar regions; and

Whereas, The plan which is proposed to carry into effect in such expedition, namely, that of establishing a temporary colony consisting of a few tried and experienced men who possess all the necessary requisites to insure success of such expedition, seems to us the one most feasible after due consideration of the history of former expeditions which have been dispatched by the Government of the United States; therefore, be it

Resolved, That we respectfully request the earnest attention and support by our Senators and Representatives in Congress of the plan of Captain H. W. Howgate, of the United States Signal Service, as one which is in our judgment worthy of a trial and support by the Government.

Resolved, That the Secretary of the Fortnightly Club be instructed to forward to our Senators and Representatives a copy of the foregoing preamble and resolutions.

The above preamble and resolutions were presented at a meeting of the Fortnightly Club, of Milwaukee, Wisconsin, January 20, 1877, and unanimously passed.

WILLIAM W. WIGHT,
Secretary Fortnightly Club.

ACTION OF COMMERCIAL ASSOCIATIONS.

[Milwaukee Chamber of Commerce.]

CHAMBER OF COMMERCE, MILWAUKEE, *January* 13, 1877.

Whereas, This Chamber is desirous of expressing its interests in and good will toward all measures calculated to forward and extend scientific explorations and experiments which may have even an indirect bearing upon such subject; therefore, be it

Resolved, That we cordially approve of the proposed appropriation of $50,000 by the General Government to aid in the establishment of a temporary colony, for the purpose of exploration and scientific research, at or near the eighty-

first degree of north latitude, under the direction of the President of the United States, and with the advice and counsel of the National Academy of Science, to carry into effect such detailed observations in the sciences of meteorology, botany, geology, and climatology, together with the perfecting of the geography of unknown regions extending to the North Pole, as may increase the sum of human knowledge, redound to the credit of the United States and sustain the reputation and honor of our country already won through the labors of De Haven, Kane, Hayes, Hall, and other eminent explorers in the northern Polar seas.

Resolved, That the Secretary be instructed to transmit to our Senators and Representatives in Congress a copy of the foregoing preamble and resolutions, and to respectfully request their careful consideration of the same.

The foregoing preamble and resolutions were introduced at a meeting of the Chamber of Commerce of Milwaukee, January 13, 1877, and unanimously adopted.

[SEAL.] N. VANKIRK, *President.*
W. J. LANGSON, *Secretary.*

[Presented in House of Representatives January 20, 1877, and referred to Committee on Appropriations.
Presented in Senate January 26, 1877, and referred to Committee on Appropriations.]

[Indianapolis Board of Trade.]

BOARD OF TRADE, INDIANAPOLIS, *January* 23, 1877.

Whereas, There is now pending before Congress a bill introduced by General Hunter, of Indiana, appropriating the sum of $50,000 to aid in the establishment of a temporary colony for the purpose of exploration and scientific research at some point near the eighty-first degree of north latitude, under the direction of the President of the United States, and to carry into effect such detailed observations in the sciences, together with the perfecting of the geography of unknown regions extending to the North Pole as may increase the sum of human knowledge and redound to the honor of our country; therefore, be it

Resolved, That this Board of Trade favors the passage of the bill, and that the Secretary transmit to our Senators and Representatives in Congress a copy of these proceedings.

[Detroit Board of Trade.]

BOARD OF TRADE ROOMS,
DETROIT, MICH., *February* 2, 1877.

Whereas, This Board is desirous of expressing its interest in and good will toward all measures calculated to forward and extend scientific explorations and experiments which may have even an indirect bearing upon commerce and navigation; therefore, be it

Resolved, That we cordially approve of the proposed appropriation of $50,000 by the General Government to aid in the establishment of a temporary colony for the purpose of exploration and scientific research at or near the eighty-first degree of north latitude, under the direction of the President of the United States, and with the advice and consent of the National Academy of Science, to carry into effect such detailed observations in the science of meteorology, botany, geology and climatology, together with the perfecting of the geography of unknown regions extending to the North Pole, as may increase the sum of human knowledge, redound to the credit of the United States, and sustain the reputation and honor of our country already won through the labors of DeHaven, Kane, Hayes, Hall and other eminent explorers in the Northern Polar seas.

Resolved, That the Secretary be instructed to transmit to our Senators and Representatives in Congress a copy of the foregoing preamble and resolution, and to respectfully request their careful consideration of the same.

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[Cincinnati Chamber of Commerce.]

CINCINNATI, *February* 2, 1877.

To the Honorable Senate and House of Representatives of the United States in Congress assembled:

Whereas, The Cincinnati Chamber of Commerce, whose province relates specially to commerce and trade, is assured that the security and extension of the commerce of the world depends largely upon accurate information respecting the physics of the globe, and that most of such information already acquired has been facilitated by observations made within the Arctic regions, and that the benefits accruing, directly and indirectly, to the commerce of the world from

Polar explorations are more than equal to the money expended in such explorations; therefore, be it

Resolved, That we, in the interest of science, as well as in behalf of commerce and trade, mutually and inseparably linked together, heartily approve and respectfully urge the passage of the bill providing for another and eminently practicable expedition toward the North Pole for the purpose of exploration and the establishment of a colony at some point north of the 81° of north latitude.

Resolved, That we heartily approve an appropriation of $50,000 by the General Government for this purpose.

Resolved, That a copy of the foregoing preamble and resolutions be transmitted to our Senators and Representatives in Congress.

B. EGGLESTON, *President.*
BRENT ARNOLD, *Secretary.*

[Presented in Senate February 6, 1877, and referred to Committee on Appropriations.
Presented in House of Representatives February 6, 1877, and referred to Committee on Naval Affairs.]

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[St. Louis Cotton Exchange.]

ST. LOUIS, *February* 5, 1877.

Whereas, There is now pending before Congress a bill introduced by General Hunter, of Indiana, appropriating the sum of $50,000 to aid in the establishment of a temporary colony for the purpose of exploration and scientific research at some point near the 81° of north latitude, under the direction of the President of the United States, and to carry into effect such detailed observations in the sciences as may increase the sum of human knowledge and redound to the honor of our country; therefore, be it

Resolved, That this Cotton Exchange favors the passage of the bill, and that the Secretary transmit to our Senators and Representatives in Congress a copy of these proceedings.

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[Baltimore Corn and Flour Exchange.]

To the Honorable Senators and House of Representatives of the United States in Congress assembled:

Whereas, It appears that an expedition to the Arctic regions is proposed upon a plan which seems to promise a fair hope of a successful issue, at a cost quite out of proportion to the value of the least probable result; and

Whereas, It is desirable that no efforts should be spared to determine questions in connection with the physical condition of the earth in the interests of commerce, agriculture and science; therefore, be it

Resolved, That we, the undersigned, members of the Baltimore Corn and Flour Exchange, heartily approve of the scheme initiated by Captain H. W. Howgate, now pending before Congress, and respectfully suggest that the bill now pending be passed with the appropriation of $50,000 to defray the cost of the expedition.

THOS. W. LEVING & SONS,
BARKER & GWATHMEY,
SAML. TOWNSEND & SON,
E. D. BIGELOW & CO.,
And others.

[Presented in House of Representatives February 1, 1877, and referred to Committee on Naval Affairs.]

[Baltimore Merchants' Exchange.]

To the Honorable Senate and House of Representatives of the United States in Congress assembled:

Whereas, It appears that an expedition to the Arctic regions is proposed upon a plan which seems to promise a fair hope of a successful issue, at a cost quite out of proportion to the value of the least probable result;

And whereas, It is desirable that no efforts should be spared to determine questions in connection with the physical condition of the earth in the interest of commerce, agriculture, and science; therefore,

Be it resolved, That we, the members of the Baltimore Merchants' Exchange, heartily approve of the scheme indicted by Captain H. W. Howgate, now before Congress, and respectfully suggest that the bill now pending be passed, with the appropriation of $50,000 to defray the cost of the expedition.

BALTIMORE, *February* 7, 1877.

JAS. CAREY COALE,
JAMES BRICKHEAD,
H. O. HAUGHTON.
And others.

[Presented in House of Representatives February 1, 1877, and referred to Committee on Naval Affairs.]

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[New Haven Chamber of Commerce.]

NEW HAVEN, *February* 9, 1877.

Whereas, The New Haven Chamber of Commerce, in common with so many similar boards in the United States, feeling a deep interest in the Polar explorations already made by our own countrymen, as also by those of other nations, believe that the plan of Captain Howgate for the locating of a colony far northward in the Arctic regions is the most feasible of any heretofore projected for the successful exploration of these regions and for the discovery of the North Pole, so long the ambition of so many expeditions; therefore,

Resolved, That this Chamber heartily approve of Captain Howgate's plan, and, therefore, of the proposed appropriation of $50,000 by the General Government in aid of the expedition.

Resolved, That the President and Secretary be instructed to transmit a copy of the foregoing preamble and resolution to our Senators and Representatives in Congress.

[Presented in Senate February 13, 1877, and referred to Committee on Commerce.]

—

[New York Merchants.]

NEW YORK, *February* 17, 1877.

To the Honorable Senators and Representatives in Congress assembled:

The undersigned, feeling a deep interest in the Polar Explorations already made by our own countrymen, as also by those of other nations, believe that the plan of Captain Howgate for the locating of a colony, far northward in the Arctic regions, is the most feasible of any heretofore projected for the successful explorations of these regions and for the discovery of the North Pole, do approve of the bill now pending before Congress appropriating $50,000 for the establishment of the colony, and respectfully urge the passage of the bill.

John H. Boynton, Boyd & Hincken, James W. Elwell & Co., Benj. F. Metcalf, John Zittlosen, James E. Ward & Co., Gerhard & Brewer, Benham & Boysen, John Norton, Jr., & Son, John D. Jones, J. P. Paulison, Thomas Hale, Arthur Leary, Ellwood Walter, Alfred Ogden, Ferdinand Stagg, Daniel Drake Smith, A. A. Low & Bros., Charles H. Marshall & Co., Grinnell, Minturn & Co., Nath. L. & Geo. Griswold, Thomas Dunham's Nephew & Co., Snow & Burgess, Thomas J. Owen & Son, Howland & Aspinwall, Lawrence, Giles & Co., R. W. Cameron & Co., George Wilson, C. H. Mallory & Co., Youngs, Smith & Co., Jonas Smith & Co., Johnson & Higgins, John D. Fish & Co., J. H. Winchester & Co., Lunt Brothers, Salter & Livermore, Floyd & Newins, Geo. W. Rosevelt, J. F. Ames, Wm. B. Hilton, Wm. A. Freeborn & Co., Smith W. Anderson, Bucknam & Co., John C. Smith, Perry Chubb, E. Sanchez y Dolz, Geo. W. Brown, Stephen H. Mills, F. Wight & Co., Baxter & McVoy, Philip J. Kiernan, Wm. B. Smyth, Fred. C. Schmidt, Thomas Norton & Co., A. K. Hadley, Theodore G. Case, Wm. L. Snyder, D. A. Hulett, Miles Beach, Robert Lyon, Jr., Edward T. Bartlett, J. W. Huntley, Francis H. Smith, Potter & Robertson, George W. Dow, L. H. Rogers & Co., Theodore Weston, Alfred Wagstaff, Jr., Abram C. Wood, John D. Vermeule, Henry Hentz & Co., Robert Dillon, J. Yeoman, Calvocoressi & Rodocanachi, James F. Wenman & Co., E. K. Powers, James S. Dean, Andrew G. Myers, J. D. Blanchard, J. H. Cheever, J. F. Fiske, Burkhalter, Masten & Co., W. H. Stanford, H. A. Howe, Wm. R. Crowell, B. F. Walcott, Levi P. Morton, and many others.

[Presented in Senate February 23, 1877.]

[Philadelphia Board of Trade.]

To the Honorable the Senate and House of Representatives of the United States the following memorial respectfully showeth:

That at a meeting of the Philadelphia Board of Trade, on February 19th, 1877, it was

Resolved, That the project for the establishment, under the authority of the President of the United States, of a temporary colony for the purposes of scientific exploration, at some point north of the eighty-first degree of north lati-

tude, meets with the approval of the Board; and that the sum of $50,000 asked of Congress for the execution of this design will be well repaid by an increase of scientific knowledge that will materially promote the welfare of mankind and the honor of our country.

The Philadelphia Board of trade respectfully solicits your favorable consideration of the above, and will ever pray, &c.

[Presented in Senate February 23, 1877, and referred to Committee on Naval Affairs.]

[Presented in House of Representatives February 24, 1877, and referred to Committee on Foreign Affairs.]

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[Nashville Cotton Exchange.]

NASHVILLE COTTON EXCHANGE, *February* 23, 1877.

Whereas, There is now pending before Congress a bill appropriating the sum of $50,000 to aid in the establishment of a colony in the Arctic regions for the purpose of scientific research and exploration; and

Whereas, This Cotton Exchange, in common with similar organizations throughout the country, and feeling that commerce and trade march hand in hand with science, and that such exploration and research would increase the sum of human knowledge and redound to the nation's honor; therefore, be it

Resolved, That this Cotton Exchange favors the passage by Congress of this bill, and that the Secretary transmit to our Senators and Representatives in Congress a copy of these proceedings.

—

[Cleveland Board of Trade.]

BOARD OF TRADE ROOM, CLEVELAND, OHIO,
February 23, 1877.

Whereas, There is now pending before Congress a bill introduced by Gen. Hunter, of Indiana, appropriating the sum of $50,000 to aid in the establishment of a temporary colony for the purpose of exploration and scientific research at some point near the 81st degree of north latitude under the direction of the President of the United States, and to carry into effect such detailed observations in the sciences, together

with the perfecting of the geography of unknown regions extending to the North Pole, as may increase the sum of human knowledge and redound to the honor of our country; therefore, be it

Resolved, That the Cleveland Board of Trade cordially favors the proposition and appropriation, and urges the passage of the bill, and that the Secretary be directed to send a copy of these proceedings to our Senators and Representatives in Congress.

—

[Boston Merchants.]

BOSTON, MASS., *February* 23, 1877.

To the Honorable Senators and Representatives in Congress assembled:

The undersigned, feeling a deep interest in the polar explorations already made by our own countrymen, as also by those of other nations, believe that the plan of Captain Howgate for the locating of a colony far northward in the Arctic regions is the most feasible of any heretofore projected for the successful explorations of these regions and for the discovery of the North Pole, do approve of the bill now pending before Congress appropriating $50,000 for the establishment of the colony, and respectfully urge the passage of the bill.

Alex. H. Rice, Gov. of Mass., Fred. O. Prince, Mayor of Boston, Jas. A. Dupee, Fred. Amory, Thomas Lamb, J. W. Brooks, Daniel Doherty, Addison, Gage & Co., Thaxter & Sons, Benj. F. Tyler, W. W. Russell, Jacob Hittinger, Jacob A. Seitz, Dr. C. C. Folsom, Dr. Samuel H. Durgin, and many others.

—

[Wilmington Merchants.]

WILMINGTON, *February* 26, 1877.

To the Honorable Senators and Representatives in Congress assembled:

The undersigned, feeling a deep interest in the Polar expeditions already made by our own countrymen, as also

those of other nations, believe that the plan of Captain Howgate for the location of a colony far northward in the Arctic regions is the most feasible of any heretofore projected for the exploration of those regions, and for the discovery of the North Pole, do approve of the bill now pending before Congress, appropriating $50,000 for the establishment of the colony, and respectfully urge the passage of the bill.

De Rosset & Co., Alex. Sprunt & Son, Harriss & Howell, R. E. Heide, Edw. Kidder & Sons, B. F. Mitchell & Son, Lemmerman & Coney, Cassidey & Ross, T. C. De Rosset, Adrian & Vollers, Wright & Stedman, T. B. Kingsbury, B. B. Moore, (Hist. Soc'y,) Jno. L. Boatwright, J. J. Conoley, C. H. Robinson, Vick & Mebane, E. Peschau & Westerman, Kerchner & Calder Bros., John. S. Cantwell, Donald MacRae, H. B. Eilers, Hall & Pearson, C. W. Harriss, Ed. Journal, Sol. Bear & Bros., H. Nutt, Williams & Murchison, John Wilder Atkinson, H. Q. Johnson, I. B. Grainger, Jos. T. Jamer, J. K. Brown, James & Brown, A. Empie, C. D. Myers & Co., Wm. J. Bühman, P. Heinsberger, Geo. G. Barker & Co., G. D. Bernheim, Prest. Hist. and Scientific Society.

[Presented in House of Representatives February 27, 1877, and referred to Committee on Naval Affairs.]

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NASHVILLE, TENN., *February* 27, 1877.

To the Honorable Senators and Representatives in Congress assembled;

The undersigned, feeling a deep interest in the Polar explorations already made by our own countrymen, as also by those of other nations, believe that the plan of Captain Howgate for the locating a colony far northward in the Arctic regions is the most feasible of any heretofore projected for the successful explorations of these regions, and for the discovery of the North Pole, do approve of the bill now pending before Congress appropriating $50,000 for the establishment of the colony, and respectfully urge the passage of the bill. James D. Porter, Governor of Tennessee; James M. Safford, J. D. Plunkett, M. D., J. B. Lindsley, M. D., E. D. Hicks, M. Burns, J. B. Nowlin, M. D., D. R. Johnson, John Lunsden, Jos. Fisher, and many others.

[Presented in Senate March 14, 1877.]

[Merchants' Exchange, Baltimore.]

The Merchants' Exchange, of Baltimore City, fully alive to the advantages to be derived from the development of Captain Howgate's scheme, for a further attempt to discover or, if unsuccessful, to at least familiarize the world with the circumstances and surroundings of the North Pole, fully endorse his plans known as the "Colonization Scheme," and heartily approve the adoption of General Hunter's bill, appropriating the sum of $50,000 in aid of the expedition.

BALTIMORE, 17*th April*, 1877.

JAS. CAREY COALE, *President*,
H. O. HAUGHTON, *Secretary*.

ENDORSEMENTS OF THE PLAN OF POLAR COLONIZATION.

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The following selections are made from the numerous communications received favoring the Polar Colonization plan in its essential features, to show the general feeling of interest in the subject among explorers and men of science.

In one particular I dissent from the views of several of the gentlemen whose communications are herewith presented, viz.: the retention of a vessel at the proposed colony, which, in my opinion, would be unwise and fatal to the success of the expedition.

—

[From the President of the American Geographical Society.]

AMERICAN GEOGRAPHICAL SOCIETY,
No. 11 W. 29TH ST., NEW YORK CITY,
January 18, 1877.

Captain H. W. Howgate:

MY DEAR SIR: Before your letter was received I inserted in my annual address a notice of your plan, and of the bill before Congress.

As you will find by my address, your mode of exploration is the one that I have uniformly approved and recommended for many years. I expressed this opinion in my address of 1869, and in the first of my addresses, which have been printed, (1870,) I declared my conviction that a passage to the Pole by water would, in all probability, not be found, and that the true method of exploration was by sledge operations upon land from the furthest point that could be safely reached by a vessel.

* * * * * * *

You will see from this that I have long been impressed with your general plan, and the only critisism I have to offer is that I think the station should not be limited to some point north of 81°; for though a vessel may winter securely in Discovery Bay, and although there is a fine seam of bituminous coal three miles from where the *Discovery* wintered, yet the region, as shown by the experience of the English expedition, and by the abandonment of the Esquimaux settlements just below it, is very barren of animal life either upon the land or upon the water, whilst at Fort Foulke it is otherwise, and a temporary colony could be maintained there without any difficulty. For this reason I think it would have been better to have said north of 78°.

It will afford me great pleasure to do all that I can to forward your views, and anything that the Society can do I am sure will be done.

The suggestion I have made as to the limitation in the bill as to location of colony is entirely for your consideration, and will in no way affect our hearty support of the measure.

* * * * * * *

Very truly yours,

CHAS. P. DALY.

[From Professor Elias Loomis, of Yale College.]

YALE COLLEGE, *January* 14, 1877.

Captain H. W. Howgate:

DEAR SIR: I have received your letter of January 7th, together with a copy of a bill to be presented to Congress, asking for an appropriation to defray the expense of another

expedition towards the North Pole. I have for many years taken a deep interest in Polar expeditions, and see no reason for abandoning further effort because former expeditions have not accomplished all that was expected. If we review the entire history of Polar expeditions since Captain Parry's first voyage, more than half a century ago, we find that every expedition has proved in some sense a failure; that is, has accomplished less than was anticipated; and some may, therefore, conclude that all the labor which has been expended on this Polar problem has been wasted. I take a very different view of the subject, and consider that the results of the many Polar expeditions, from the first voyage of Captain Parry to the present time, are worth far more than all the money and labor which have been expended on them.

In order to estimate the value of the results of these expeditions we should consider what would have been the state of our knowledge of the physics of the globe if no such expeditions had been undertaken. There is scarcely a problem relating to the physics of the globe which can be fully understood without a knowledge of the phenomena within the Polar regions. Whatever phenomena we may wish to investigate, it is of special importance to determine its maximum and minimum values, and in nearly all questions of terrestrial physics one or other of these values is found in the neighborhood of the Pole. If, for example, we wish to determine the distribution of temperature upon the surface of the globe, it is specially important to determine the extremes of temperature, one of which is to be found near the Equator and the other near the Poles. If we wish to investigate the system of circulation of the winds, our investigation would be sadly deficient without a knowledge of the phenomena in the Polar regions.

If we wish to study the fluctuations in the pressure of the atmosphere, whether periodical or accidental, we cannot be sure that we understand the phenomena in the middle latitudes unless we know what takes place in the Polar regions. If we wish to investigate the currents of the ocean, we find indications of currents coming from the Polar regions, and it is important to be able to trace these currents to their source. If we wish to investigate the laws of the tides, we need observations from every ocean; and observations in the Arctic regions have a special value on account of their distance from the place where the daily tidal wave takes its

origin. If we wish to study the phenomena of atmospheric electricity and of auroral exhibitions, no part of the world is more important than the Polar regions. If we wish to study the phenomena of terrestrial magnetism, observations in the Polar regions have a special value, since it is here the dipping needle assumes a vertical position and the intensity of the earth's magnetism is the greatest. If we wish to determine the dimensions and figures of the earth, we require to know the length of a degree of latitude where it is greatest and also where it is least. If we wish to determine how the force of gravity varies in different parts of the world, we require observations of the second's pendulum both where it is greatest and where it is least. In short, there is no problem connected with the physics of the globe which does not demand observations from the Polar regions, and generally the Poles and the Equator are more important as stations of observation than any other portions of the earth's surface. If the information which has been acquired upon the various subjects in the numerous Polar expeditions of the last half century were annihilated, it would leave an immense chasm which would greatly impair the value of the researches which have been made in other parts of the world.

The subjects to which I have here referred are scientific rather than commercial; but many of them have an important bearing upon questions which affect the commerce of the globe. In the attempts which are now being made by the joint efforts of the principal nations of the globe to determine the laws of storms, if we could have daily observations from a group of stations within the Arctic circle, it is believed that they would prove of the highest value in enabling us to explain the phenomena of the middle latitudes. Every winter upon the eastern side of the Rocky Mountains we find an intensely cold wave moving down from the northward and spreading over a large portion of the United States. How can we fully understand the cause of the great changes of temperature which so frequently occur during the winter months unless we know where this cold air comes from? And how can this be determined without fixed stations of observation extending northward over the Polar regions?

The vast extension of the commerce of the world in recent times and its increased security are due in no small degree to more accurate information respecting the physics of the globe, including such subjects as the mean direction and

force of the prevailing winds; the laws of storms; the use of the barometer in giving warning of approaching violent winds; the surest mode of escaping the violence of a storm when overtaken by a gale; the most advantageous route from one part to another; the direction and velocity of the current in every ocean; the variation of the magnetic needle in all latitudes, and its changes from year to year; together with many other problems; and most of these investigations have been greatly facilitated by observations which have been made within the Arctic regions. I do not regard it as any exaggeration to claim that the benefits which have resulted both directly and indirectly to the commerce of the world in consequence of Polar expeditions are more than equal to all the money which has been expended on these enterprises.

Is any additional advantage to the commerce of the world to be anticipated from further explorations in the Polar regions? Undoubtedly. Precisely what these advantages may prove to be we cannot certainly pronounce beforehand; but upon most of the questions to which I have already alluded more minute information is needed. The demands of science are by no means satisfied, and we may confidently anticipate that any advance in our scientific knowledge respecting questions connected with the physics of the globe will impart increased security to commerce. If a steamer starting from New York and traveling northward could pass directly over the North Pole through Behring Straits into the Pacific Ocean it would be a triumph of geographical science equal to the first discovery of America. Whether such a result will ever be witnessed we cannot safely predict; but past explorations have not shown that such an achievement is impossible. I hope we shall not rest contented while so much that is clearly feasible remains to be done, and until the northern boundary of Greenland has been traced.

Hoping that your efforts to secure assistance in the further prosecution of this Polar problem may prove successful,

I am, with much respect, yours truly,

ELIAS LOOMIS.

[From Superintendent C. H. Haskins, of the Northwestern Telegraph Company.]

GENERAL SUPERINTENDENT'S OFFICE,
MILWAUKEE, WIS., *January* 24, 1877.

Captain H. W. Howgate:

DEAR SIR: Yours of 21st received. To work a naked wire through or on the snow it is only necessary to observe one or two points.

1st. The snow must be absolutely dry. This condition you would probably have in the Polar regions nearly all winter.

2d. Reduce the tension of your battery to the lowest possible point. To do this use a good conductor and instruments of as low resistance as practicable for the circuit and few cells of battery.

I really think that for your expedition, if you intend to establish stations 40 or 50, or even 100 miles apart, that a form of magneto machine, if made sufficiently light to be portable and with coarse helices, to give you a *quantity* current, would be the thing for you, thus ridding you of the nuisance of battery and battery material, freezing, &c. In this case you would use polarized relays, as more sensitive. Your great trouble will be, not escapes from grounds, but any good ground at all for your lines. In this case your only remedy would be a metallic circuit, which would require two wires, which would get together and bother you.

With dry snow there is absolutely *no escape*. The insulation is as perfect as can be. I told you I had worked over one hundred miles with the line under the snow and on it.

Don't misunderstand me. I do not mean the entire wire was covered, but it was blown down in places, sometimes on the snow, again in it, and it worked uninterruptedly until the thaw grounded it. The fact of perfect insulation may be tested at any time with the thermometer at zero. Ground one end of a large battery, lead the other end through a delicate galvanometer and then to snow on the ground. You can't get any deflection, except such as results from *filling* the wire. There will be no escape.

The line from Marquette to Sault Ste. Marie, Lake Superior, runs along the coast, over hills and through valleys in the forest. During summer, when the leaves are out, the line leaks badly from contact with the green leaves and shoots. It is always leaky. In the winter it is blown

down, and, in spots, buried for weeks. It is in this condition in spots now. Yet I was at Marquette two weeks ago, and not a sign of escape in the wire. It was perfectly *clear*.

To produce the maximum effect your instruments in circuit should not exceed the resistance of the battery and line wire. If you use an induction machine (a magneto) the resistance of the coils and line wire would be very light, using No. 14 copper wire, and you could work long distances with 56 ohm relays polarized. I have worked two 50 ohm polarized relays with one of Kidder's magneto machines, costing $8.00, used for domestic medical uses.

A magneto machine that a man could turn with a crank, and not weighing over 40 pounds, with a commutator to translate both currents in one direction, could be made for you that would do your work. Or, you could use a small Gramme machine, with a permanent magnet, as an excitant.

The snow business is *all right*. Go ahead. If I can help you, say so.

Yours, in haste,

CH. H. HASKINS.

—

U. S. NAVAL OBSERVATORY.
WASHINGTON, D. C., *January* 25, 1877.

MY DEAR CAPTAIN: You have asked me for my views in regard to the best methods of conducting Arctic exploration. I take great pleasure in complying with your request.

* * * * * * *

I am opposed to all spasmodic efforts to reach the Pole, because the chances of success are not commensurate with the necessary outlay. There have been comparatively few well organized Polar expeditions, and all these have endeavored to effect their object in a single season by a spurt, as it were. They have gone at erratic intervals, knowing comparatively nothing of the laws that govern the Arctic seasons; so that, so far as their knowledge of the meterological and hydrographical conditions of the Polar regions was concerned, each of them stood on equal chance of success. Under these circumstances each expedition was justly regarded as an experiment. The failures that attended them were, in a great measure, due to a blind haste to gain their

objects. That eminent scientists should have considered the quite meagre results as an ample reward for the expenditure of life and money, proves only the magnitude and extent of the scientific secrets which are locked up in the frozen North awaiting the intelligent and persistent explorer. The only legacies that can be considered of absolute value which these expeditions have left to the world are the feats of heroism and endurance that send the enthusiastic glow of admiration through the heart of humanity, the bloodless deeds of renown, and the immortal glory won, not by triumphs over fellow men, but by victories over nature in its most forbidding guise.

* * * * * *

A Ship bearing reinforcements and suppiles should, if possible, visit the colony each year. No one should be compelled to remain longer than one winter either on the ship or at the station; and the commander should each year order home those whom experience has proved to be unserviceable or uncompanionable.

The band of explorers should spend each spring and autumn in making excursions in various directions and in paying minute attention to the accurate survey and delineation of the country traversed. Dogs should be used for draught. They are the natural teams of the country; they require little food and no clothing; they need no shelter; they are fleet and strong; they will serve as food to a famishing party, and, moreover, they multiply so amazingly that, with proper precautions, the kennel need never be empty. The sleds should approximate in shape, size and material to those used by the Esquimaux. At least they should be fastened together by thongs of raw hide and should be shod with ivory. Esquimaux should be employed as dog drivers to accompany all sledge expeditions, both because they understand how to take care of dogs, how to build, quickly and well, snow-igloos (which are best suited for temporary shelter,) and also because they know how to hunt, which is a very important consideration. Now, white men, with all their genius and skill, while able to do these things tolerably after considerable practice, are totally unable while on a sledge journey to make themselves as comfortable as the Esquimaux, who, at the same time, need less food and clothing. Hence, the knowledge and aid of these hardy sons of the North should be invoked. A man with ordinary tact and judgment can

secure a willing service from these innocent and docile people.

* * * * * * *

A continuous effort would also afford an opportunity to test men, and, in time, those qualified physically and mentally for the peculiar service would be secured. A long residence at the station or on the ship—whether continuous or broken by returns home for recuperation—would give an experience in the modes of Arctic travel that would be valuable indeed, and that would insure final success. The service would be eminently desirable, and each year hosts of volunteers would present themselves, from whom good men could be chosen. Under proper management scurvy would not appear, and if the quarters were comfortable and the food plentiful and of the right kind, the men could live as well and happily as in more southern latitudes.

In order to preserve the health of the crew, special attention should be paid to discipline. The men should not be required to expose themselves so as to become very cold or wet except under the most imperative necessity; neither should any unnecessary service, nor service of questionable expediency, be forced from them. The great solicitude of a commander of an Arctic expedition should be to keep up the spirits of his men, to banish all repinings and disquietude, and to promote their happiness and thorough content. Scurvy has no power over a man with a cheerful frame of mind if only he has the opportunity to provide suitably for the wants of his body. Exercise must be performed cheerfully and with the mind interested, to be of any service; enforced exercise rarely accomplishes the intended results.

* * * * * * *

Land as a base of operations is essential for the best kind of Polar effort, not only because thereby whatever advance may be made can be held, but because the value of the observations will be increased if made at a permanent station. Many routes present this advantage, and I would not presume to say, absolutely, which would offer the fewest obstacles to an advance to the Pole. I trust that in a few years every possible route will be faithfully tried.

But as an American and for an American expedition, I would unhesitatingly recommend the Smith's Sound route—the field in which Kane, Hayes and Hall won such renown—a field that still affords an opportunity to show the world

what American pluck and enterprise can accomplish. It will be unnecessary to mention additional reasons for this preference. They will naturally present themselves to the Arctic student.

* * * * * * *

The United States has the right to consider the Smith's Sound route as peculiarly its own, and no effort should be spared to carry on in that direction the work of her illustrious heroes, living and dead. Her history contains no brighter pages than those that record their courage and endurance.

* * * * * * *

Your plan, so far as you have announced it, is so like mine that it seems almost unnecessary to say how heartily in sympathy I am with you in your efforts to organize a Polar expedition upon a sound basis. I trust that you will be very successful; that Congress will determine to carry on the good work, and that you will be spared to share its triumphs. Polar research offers more rewards in the way of national glory and renown than any other similar enterprise.

I am fully convinced that the flag of the United States can be planted upon the North Pole itself if the proper support be given to those who have the patience and determination to attempt and pursue the indicated plan.

When the Arctic regions shall have thus been made known, and the necessary scientific observations secured, then the attention of explorers might be directed to the South Pole, and under a corresponding system that vast and unknown Antarctic region will yield up its secrets, and man will at last "have dominion over all the earth," and prove his obedience by attempting to "subdue it."

Very respectfully and sincerely yours,

R. W. D. BRYAN.

To Capt. H. W. HOWGATE, U. S. A., *Washington, D. C.*

[From Captain George E. Tyson, of the *Polaris*.]

WASHINGTON, D. C.

Captain H. W. Howgate:

DEAR SIR: I was very agreeably surprised to see your letter, published some time ago in the New York papers, containing a proposition to Congress to appropriate money,

ship and the necessary equipment for another expedition to endeavor to reach the North Pole, and I heartily concur with you in the plan therein suggested as the most practicable yet devised. It is a matter of no little surprise to me that there has not been more of an outpouring of American enthusiasm toward the achievement of the success of this great enterprise, and that, too, when we consider the magnitude and great importance of the work. It is unquestionably a noble effort, and the scientific societies of the country would do well to unite in memorializing Congress relative thereto. Now is the time, and if this Government fails this year, through a spirit of parsimonious economy, to appropriate the means necessary to the furtherance of this project, England or Germany will, in all probability, secure the honor of this great achievement.

GEORGE E. TYSON.

—

[From Captain H. C. Chester, of the Polaris Expedition.]

To the Editor of the New York Times:

Having had some experience in Arctic exploration, and being familiar with its dangers and difficulties, my attention has been called to the letter of Captain Henry W. Howgate, published in the "Times" on the 26th of December. I beg to express my thorough approval of the plan submitted by Captain Howgate, as I believe it to be the only way by means of which the Pole can be reached. All future explorations tending to solve the mysteries of this extreme northern region will have to be prosecuted by means of gradual advances made from some main depot. Exactly the same idea was entertained by Captain Hall. When we were at the furthest point of land, about 82° 8″, in October, 1871, we looked at the so-called inpenetrable sea of ice. Then it was moving ice and water. From its smoothness we felt very sure that when the colder weather set in we would have but little trouble traversing the channel in the spring. We should have endeavored to have crossed Robeson's Straits, and would have tried to gain a point of land visible northwest of us, which land we called Cape Union, and which we calculated was some sixty miles distant. If Captain Howgate's suggestions of establishing a party at or about Robeson's Channel, or to the west of it, is ever carried out, I

think these people would, by progressive stages, reach in time the much desired goal. As to the obstructions mentioned by Captain Nares, all I can state is that such impediments did not exist in my time. The reasons why I suppose they cannot be so formidable are founded in the following observations: When, in May and June of 1872, we lay with the boats and crew of the *Polaris*, twenty-five miles from the ship, on the floe ice, waiting for an opening in Robeson's Channel, in order to cross it, during four weeks' time the straits were blocked with ice, but this ice was all moving south. We found no opening for a month, and were unable to use our boats. This ice went southerly at the uniform rate of about one and a half miles an hour, and was never checked, save when the winds blew south or southwest. If, then, the strait was filled with ice moving southerly, such an impassable barrier of ice as Captain Nares speaks of must have been found at a point very much further north than the land designated by us as being Cape Union. I do not think there could have been much of an error as to the distance we supposed ourselves to be from this Cape Union, and the North Pole could not have been more than 420 miles north of it.

When Captain Hall and the writer undertook the fourteen-day sledge journey, when we worked our way along in the twilight, Captain Hall said to me, "I am satisfied that the only way to reach the Pole will be for us to carry our provisions across Robeson's Channel, to form a depot on the other side, and from thence take out parties. It is work we must lay out for ourselves this spring." I believe, had Captain Hall lived, he would have carried forward the work just as Captain Howgate proposes; that is, by establishing depots and making progressive stages. Captain Hall's untimely death, on the 8th of November, 1871, prevented his accomplishing this design. I think, in order to prosecute the plan proposed by Captain Howgate, there would be no difficulty in procuring thirty men accustomed to Arctic travel, who would ultimately achieve success. As to fresh blood food, I am positive that, at least in the neighborhood of Robeson's Channel, the musk ox can be found from May to October. I shot the first musk ox on the Polaris plane in 81° 40″ during the latter part of September. With the crew of the *Polaris* in the latitude of 82° we killed twenty-four musk oxen. I do not believe there would be any trouble in provisioning thirty men yearly with this fresh food. I there-

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fore must freely indorse Captain Howgate's views, and say with him, "Let an expedition be organized to start in the spring of 1877, and I firmly believe that in 1880 the geography of the Polar circle would be definitely settled, and that without loss of life."

H. C. CHESTER.

PHILADELPHIA, *Saturday, December* 30, 1876.

[From Mr. Robert Seyboth, a member of Dr. Hayes' expedition.]

Capt. H. W. Howgate:

* * * * * * *

I have not the slightest doubt if a sufficient number of energetic men, well selected and officered, can acclimate themselves to the terrible severity of Arctic winters, the greatest difficulty in the way of the discovery of the Pole will have been overcome, for such a party and depot could be used as a base of operation from which to push forward, in favorable junctures of temperature and their accompanying condition, successive posts, each one to be permanently held until the next was established, and until some favoring season made the open Polar Sea a navigable reality.

The great question to be answered in considering your scheme is the possibility of sustaining human life at such high latitudes for a sufficient length of time. I do not hesitate to answer this question in the affirmative. My own experience during a stay of nearly two years within the Arctic circle, and with an expedition that possessed none of the comforts and safeguards usually provided for Arctic explorers, warrant me to believe that a systematically conducted plan of colonization, such as you propose, would meet no insurmountable difficulties in the effort to sustain life and sufficient robustness to carry out the work of exploration. Scurvy, the great enemy of former explorers, can be entirely avoided by adopting the proper hygienic precautions, as has been fully proved by the late Captain Hall, who spent several years in succession in company of the Esquimaux, in perfect health and without assistance from the outside world.

It is a noteworthy fact that American whalers, who frequently remain two or more successive winters in the Arctic regions, do not suffer from scurvy while wintering, but

are almost invariably afflicted with the fell disease during the homeward voyage. Why? Because they do not hesitate to eat plentifully of seal, walrus, bear, and even whale meat, all of which is readily obtainable in the highest latitudes. To this diet I myself found no difficulty in becoming accustomed, and, consequently, did not suffer from scurvy until after the enforced resumption of "salt junk" on the homeward stretch. Granting, then, the possibility of colonization, I fully believe that the adoption of your scheme would strike at the root of former failures in Arctic explorations, for it substitutes the steady conquest, step by step, in place of the spasmodic and unsustained efforts hitherto made at the sacrifice of untold treasure and the loss of great and noble lives.

Very respectfully,

ROBERT SEYBOTH.

[Letter of the Secretary of the Navy.]

NAVY DEPARTMENT, WASHINGTON,
February 2, 1877.

SIR: In connection with House bill No. 4,339, now in your hands, and which provides for another Arctic expedition, I have to express a hearty interest therein, and an earnest hope for the success of the plan. The successful sledge journey made by Captain Hall before his death, the concurrent testimony as to a Polar sea open in some seasons, and all the details of evidence from the *Polaris* crew, seem to show that success is possible. Qualified officers, I doubt not, will gladly volunteer for such duties as may be assigned the navy in connection with such an expedition. I am convinced, however, that no expedition should be sent to this dangerous and distant region except under the sanction of the strictest military discipline.

I have the honor to be, &c.,

GEO. M. ROBESON,
Secretary of the Navy.

HON. BENJAMIN A. WILLIS,
Of the Committee on Naval Affairs,
House of Representatives.

[Letter of President Joseph Henry, L. L. D.]

SMITHSONIAN INSTITUTION, WASHINGTON,
January 31, 1877.

SIR: Your letter of the 30th instant, asking my opinion as to the plan of Captain Howgate for explorations in the Arctic regions, and its utility in regard to scientific and commercial results, has been received, and I have the honor to give you the following reply:

From my connection with the Smithsonian Institution and the National Academy of Sciences, I am, of course, interested in every proposition which has for its object the extension of scientific knowledge, and, therefore, I am predisposed to advocate any rational plan for exploration and continued observations within the Arctic circle.

Much labor has been expended on this subject, especially with a view to reach the Pole; yet many problems connected with physical geography and science in general remain unsolved.

1. With regard to a better determination of the figure of the earth, pendulum experiments are required in the region in question.

2. The magnetism of the earth requires for its better elucidation a larger number and more continued observations than have yet been made.

3. To complete our knowledge of the tides of the ocean, a series of observations should be made for at least an entire year.

4. For completing our knowledge of the winds of the globe, the results of a larger series of observations than those we now possess are necessary, and also additional observations on temperature.

5. The whole field of natural history could be enriched by collections in the line of botany, mineralogy, geology, &c., and facts of interest obtained with regard to the influence of extreme cold on animal and vegetable life.

All of the above mentioned branches of science are indirectly connected with the well being of man, and tend not only to enlarge his sphere of mental pleasures, but to promote the application of science to the arts of life.

As to the special plan of Captain Howgate, that of establishing of a colony of explorers and observers, to be continued for several years, I think favorably.

The observations which have previously been made in the

Arctic regions have usually been of a fragmentary character, and not sufficient in any one case to establish the changes of the observed phenomena during an entire year, whereas to obtain even an approximation to the general law of changes a number of years are required.

It may be proper to state, in behalf of the National Academy of Sciences, that should Congress make the necessary appropriation for this enterprise, the Academy will cheerfully give a series of directions as to the details of the investigations to be made, and the best methods to be employed.

I have the honor to be, very respectfully,

Your obedient servant,

JOSEPH HENRY,
Secretary Smithsonian Institution,
President National Academy of Sciences.

Hon. BENJ. A. WILLIS,
House of Representatives.

[Letter of Admiral David D. Porter.]

WASHINGTON, D. C., *January* 31, 1877.

SIR: I beg leave to acknowledge the receipt of your note of January 30, with accompanying pamphlet, in relation to Polar colonization and exploration.

I have examined the pamphlet with the care that the importance of the subject demands.

I have always been an advocate for Arctic exploration, in whatever form it might be undertaken, and I think there would be no greater difficulty in carrying out an enterprise in the manner you propose than there would be in a ship. In fact, if an expedition was promptly fitted out in the first instance, and landed in good condition at the point proposed as headquarters, it would be less hampered if the ship should return home until wanted with supplies.

In my opinion, there is an open sea for two hundred miles toward the Pole; that there are high mountains, from which are precipitated the icebergs which lately blocked up Robeson's Channel, and that had Markham's farthest point been exceeded by sixty miles the pack would have been passed and open water reached again.

Every few years we must expect just such a pack as Cap-

tain Nares encountered, which will probably last for a year or two, and will then break up.

If, at the moment of breaking up, men and boats are in readiness to take advantage of the opportunity, a great advance conld be made toward the Pole.

There are no greater hardships to be encountered as high as 83° than have heretofore been surmounted by the intrepid explorers of the Arctic regions, and when we reflect that a party from the *Polaris* drifted eighteen hundred miles on a cake of ice, and that an infant and its mother were all that time exposed to the inclemencies of the Arctic regions, we ought to have no doubts about a company of strong, active men, well provided with everything necessary to make life endurable in that desolate region.

Certainly no weather can be more severe than that encountered by the officers and men of the *Alert* and *Discovery*, who experienced a temperature of 100° below the freezing point. It would seem that there are actually no drawbacks in the way of weather which have not been encountered before, and we are able to make every preparation to meet the difficulties in our way.

It becomes now simply a question of hardy men with brave hearts and cheerful dispositions, provided with an ample stock of the best provisions, and with means of amusement to make the winter nights pass as speedily as possible. The greatest difficulty will be to keep up the spirits of the men, and this matter should be very seriously considered in selecting the individuals for an expedition of this kind. Nostalgia is the great enemy you would have to fear; and if every man should be obliged to understand some mechanical pursuit which he could follow when the party was laid up for the winter, it would go far toward bringing about a successful issue.

In the event of such an expedition as you propose, I see a fine opportunity of utilizing the electric telegraph. Wires could be laid along on the ground or ice without much danger of their being carried off by bears or foxes.

I am no believer in a northwest passage for any practical purposes, but I do believe that there are a number of scientific subjects that can be better demonstrated at the North Pole than anywhere else, and I think we owe it to ourselves to know all about a matter which has hitherto remained in comparative obscurity.

In establishing your colony I would particularly suggest

that a number of houses be erected and somewhat separated. That of itself would tend to create a diversion by causing the men to visit each other frequently. It would be well, however, to have one central depot under the eye of the commanding officer, where the command could be assembled as occasion might require. These houses could be made in sections and put up at the end of the voyage. They should be lined with thick felt, and would be very comfortable.

In connection with the proposed expedition, I recommend a combination of sledge and boat, somewhat after the plan of the gutta-percha or kerite-rubber life-rafts used in the Navy. They could be made very light for carrying packs, and when forced to take the water could be navigated with safety. If such appliances had been more used in Arctic explorations many lives might have been saved.

In conclusion, permit me to say that I can see no objection whatever to your plan, and hope you may meet with the success your energy deserves.

Very respectfully, yours,

DAVID D. PORTER, *Admiral.*

Captain H. W. HOWGATE, U. S. A.,
Signal Office, Washington, D. C.

[Letter of Rear-Admiral Charles H. Davis.]

NAVAL OBSERVATORY,
WASHINGTON, D. C., *January* 31, 1877.

SIR: I have the honor to acknowledge the receipt of your communication of the 30th instant, and to say in reply, that the plan for Arctic exploration proposed by Captain Howgate, United States Signal Corps, meets my entire concurrence and approval.

The general principles laid down by Captain Howgate for the conduct of future Arctic expeditions seem to be universally adopted. These principles originated in the recent expedition under Captain Hall.

Very respectfully, your obedient servant,

C. H. DAVIS,
Rear-Admiral, Superintendent.

Hon. BENJ. A. WILLIS,
Chairman Sub-committee on Naval Affairs,
House of Representatives.

[Letter of Dr. Isaac I. Hayes, Arctic Explorer.]

STATE OF NEW YORK, ASSEMBLY CHAMBER,
ALBANY, *February* 12, 1877.

MY DEAR SIR: I am glad to see you are getting on so well with your proposed expedition, and that the matter is in such good hands. You can, of course, always rely upon me for any assistance in my power. I think your scheme feasible, and trust sincerely that you will obtain the necessary appropriation. Your general plan is a good one, and how fully I am in accord with it you may judge from a paper read by me before the Geographical Society in New York, November 12, 1868, from which I extract the following:

"My views in this respect are in no way changed, but rather they are confirmed by events. I give this simple enumeration of its advantages: 1st. Land as a base of operation, 2d. The opportunity to colonize a party of hunters and natives, as a permanent support. A glance at the map will show you how important is the first of these elements; the second requires a further explanation. The colony was indeed the key to the plan which I had proposed for 1862. Had I been able to return that year, I would have started with two vessels, one a small steamer, the other a sailing vessel as a store ship. Pushing through the middle ice of Baffin Bay, I would have steered for Port Foulke, my old winter harbor, at the mouth of Smith Sound. Here I would have secured the auxiliary vessel, and, remaining only a sufficient length of time to see the natives gathered together and the wheels of my little colony set in motion, I would have sought the west coast of Smith Sound with the steamer, and through the land-leads have worked my way to the Polar water. Failing to accomplish this the first season, I would have secured a harbor for the winter, and pushed on the work as opportunity offered. Failing altogether, (in the event of finding the ice too closely impacted at the head of Smith Sound to admit of a passage,) I would still have secured my object, for with a provision depot now within six hundred miles of the Pole, with the colony at my back, and in the winter readily accessible, with dogs breeding there, and with furs and provisions accumulating, I would have overcome the obstacles which embarrassed me in 1860 and 1861, and which had embarrassed Dr. Kane before me. Once in this favorable situation I would have

brought up my available strength from the colony, and in the early spring, put out depots of provisions along the line of Grinnel Land, and, following them up by a boat mounted on runners, I would then have sought the open water and the Pole. Such was my plan seven years ago. It is my plan to-day. I believe it reasonable, and experience convinces me that it is practicable. I even believe that the chances are greatly in favor of the success of the first part of the scheme; that is to say, that the ice belt can be penetrated with the steamer, the open sea navigated, and Behring Strait and the Pacific Ocean reached."

If you care to follow up the subject so far as my views are concerned, you will find them fully expressed in the Journal of the Geographical Society for 1869, volume 2, part 2. I think it will be evident to you that the great feature of my plan was that the colony at Port Foulke would be always accessible from home every summer, with as much certainty as any port in the world. Besides, it is one of the most prolific centers of animal life in all that region. Reindeer are numerous in its vicinity, my party capturing upward of two hundred during our ten months' stay in our winter quarters. During the summer the air was teeming with bird life, and the sea was alive with walrus and seal. Bears and foxes were also numerous. Your extensive reading upon the subject of Arctic exploration will have shown you that men will not long endure the Arctic climate. Even Sir Edward Parry, the greatest of all Arctic navigators, found himself obliged to return home after two winters, mainly because of the disturbed *morale* of his men. The long-continued darkness of the winter, the entire deprivation of society, and the universal cheerlessness have a singularly depressing influence upon the mind, and you will therefore at once perceive the value of establishing a station where annual intercourse can be had with home, whence the sick and weary can be sent away, and new recruits brought into the field.

With Port Foulke as a principal station, and other points subordinate to it established on the coast of Grinnel Land, up to Lady Franklin Bay and beyond, I think success would be assured in the course of three or four years. In any case, a vast amount of scientific information would be obtained at little cost and little risk to life.

Wishing you every success in your praiseworthy endeavor, believe me, very truly, yours,

I. I. HAYES.

Capt. H. W. HOWGATE, *Washington, D. C.*

[Letter from Rev. Eliphalet Nott Potter, D. D., President of Union College.]

UNION COLLEGE, SCHENECTADY, NEW YORK,
February 15, 1877.

MY DEAR MR. WILLIS: * * * I have not noticed whether the bill for Arctic exploration has yet been reported; if not, as I understand it to be in your hands, permit me to say, for myself and the faculty, that we regard the measure with great solicitude, and hope much from its becoming a law. In the naturally intense interest which you feel in the presidential national question, don't fail to remember and to press this measure of importance to science and the welfare of the world.

It will be a proud thing for the practical genius of America to carry out the only feasible approach to the solution of a question, costing only a useless outlay of life and treasure so long as the end is pursued by the old method.

In haste, and sincerely, yours,

E. N. POTTER.

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[Letter from Dr. John Rae, Arctic Explorer.]

2 ADDISON GARDENS,
KENSINGTON, 23*d February*, 1877.

DEAR SIR: I beg to thank you for the pamphlet you have so kindly sent me through our Geographical Society, giving your plan of an Arctic expedition, or a series of them, via Smith Sound, a specially American route, by which I think there is much yet to be done.

* * * * * * *

Your plan I think an admirable one, and I do trust your Government will take it up in a liberal spirit, and that suitable men will volunteer for the rough but most attractive work.

Having heard of your plan before I received your pamphlet, I yesterday sent off by post a long list of suggestions (founded upon my own Arctic experience and life in the Hudson Bay Territories,) to the President of the Geographical Society, New York, with a hope that one or two of them might be useful.

Wishing you every success, believe me faithfully yours,

JOHN RAE.

Captain HOWGATE.

The following letter is from a gentleman who was connected with Arctic exploring parties in the search for Sir John Franklin. He had the friendship and esteem of Dr. Elisha Kent Kane, and is often referred to in the works of that lamented gentleman:

ST. ANDREWS, MANITOBA,
August 22, 1877.

To the Editor of the New London Telegram:

SIR: In a late issue of a local paper of this province I find that a Polar expedition is now in course of equipment, and will sail from New York in July next. As one who takes an interest in Arctic matters, having commanded one of Lady Franklin's private Arctic expeditions, will you kindly permit me, through you, to say by way of sympathy and encouragement to those going, that I consider such an enterprise as likely to be productive of two primary results.

I believe, in the first place, that from the highest northern points attained by Hall and Nares, the North Pole may be easily reached, and by sledges. To accomplish this it is only necessary to have proper men and other appropriate equipment. The men should be those accustomed to the use of snow shoe and sled. Their food should consist mainly of pemican and dried meat, prepared after the manner of the Red river buffalo hunters. Such food is compact, nutritious, and not likely to give scurvy. Their clothing should be strong, woolen underclothing, with dressed moose-skin or its nearest equivalent, as the outer garments. As foot gear nothing can equal the Indian moccasin.

To be prepared for every eventuality they should be provided with two kinds of sledges—the Esquimaux sled, which has runners, and the Indian flat sled. The first is best fitted for running over crusted snow, the other over soft snow, such as Nares found. The fuel for journeys should be spirits of wine, and snow houses for shelter, instead of tents; the beverage only tea and coffee—no spirits whatsoever.

Being thus provided and setting out due north, say on the first of April—March, in so high a latitude, would be too cold—say from latitude 80° north, they would have four months before them for accomplishing the distance of twelve hundred miles—a feat that has already been accomplished. Instead of an open "Polar sea" it is most likely the party would find a glazier covered land to travel over. The un-

usually heavy ice that Sir G. Nares met with, is to be indicative of land formed ice, precisely similar to that found in the Antarctic region.

The open "Polar sea" will, I believe, be in the end found to be the tail end of the gulf stream. This current entering the Arctic regions between Iceland and Nova Zembla, I believe, sweeps westward after meeting with northern unknown lands and ultimately finding its way to Robeson's (of Nares) Channel, enters that and so passes southward through Baffin's Bay into the Atlantic.

A stream like this can alone account for Arctic summer birds, in going north in autumn and south in spring, in going to and returning from their winter haunts. They may fairly be supposed to round the northern coast line of Greenland, being thus guided by the higher temperature both of the water and the atmosphere in this, the supposed termination of the gulf stream.

Cold, dismal, and uninviting as the Smith Sound region is, it nevertheless has its undeveloped resources no less than other countries. The walrus seem to be abundant in that region, also the Polar bear, the musk ox, the reindeer, and other animals. With the aid of the Esquimaux, provided with the proper requisites for it, they might procure large numbers of these animals. The seam of coal discovered by Nares would supply a first requisite for a comfortable fireside.

The expedition should carry with it presents for the Esquimaux, such as saws, axes, knives, fish-hooks, awls, gimlets, drills, files, needles, and other utensils. The Esquimaux discovered by the late lamented Dr. Kane are United States citizens, and must be living in that state that geologists describe as the "stone and iron age." Any tool, therefore, with an edge to it must be of incalculable value to such a people. With a moderate supply of these, but more than all, with guns and ammunition, such as we may suppose to be stored in United States stores, as now useless relics of the late war, how much might be done to incorporate "the less advanced with the more progressive man," and so turn to account that which is at present as if it were not in existence.

Very truly yours,

WILLIAM KENNEDY,
Late Commanding Lady Franklin's Private Arctic Expedition.

[From the New York Herald, May 20, 1877.]

THE POLAR COLONY.

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Another letter on Captain Howgate's plan, from the accomplished Arctic explorer, Julius Payer, will be found in our columns to-day. It is a thoughtful contribution to the comprehensive study of this scheme of discovery, which seems to grow in favor with the writers on the subject in proportion as it is considered, either in the light of arguments in its favor or those against it; for it bids fair to be conceded that there is no objection to it that does not equally apply to a nautical expedition compelled to winter in the Arctic regions, while there appear to be several points of great importance in which it has a decided advantage over such expeditions. Our readers will find many objections fairly stated in the communication to which we refer, and we do not believe that they are made unduly prominent. No enterprise of this nature is to be conducted, even to that degree of success of which it is rationally capable, by shutting our eyes to the obstacles. Indeed, the choice of means for accomplishing an end confessedly surrounded with the greatest difficulties is a choice only between different sets of obstacles, and it has to be duly weighed which of these, if any, is absolutely insuperable. It is evidently the opinion of Payer that the difficulties in this case are not that of that nature. It may be said now of this as of many other projects first scouted as visionary, that the conscientious study of its possibilities has placed it in the category of attempts sure to be made at no remote period in the future.

FRANKFORT-ON-THE-MAIN, *April* 1, 1877.

To the Editor of the Herald:

The Congress of the United States had recently before it a bill, which was referred to the Naval Committee, providing an appropriation of $50,000 for the establishment of a Polar colony. This colony is to be situated about four hundred miles from the North Pole, and to accomplish in patient leisure what the English North Pole expedition failed to achieve. The author of this project is Captain H. W. Howgate, of the United States Signal Service. Captain Howgate's plan is to plant a number of tough, determined

and experienced men somewhere in the vicinity of the Arctic Sea. The place in which the *Discovery* passed the last winter has been considered most suitable for this purpose. The colony is to consist of fifty men, to be engaged for three years. A house in Lady Franklin's Bay is to be their dwelling place; an advance depot is to be established at the place where the *Alert* wintered, and to be garrisoned with a few men in the summer, and both stations are to be connected by copper wire and the necessary portable batteries A ship is to be sent out to plant the colony, and then return every year to bring it supplies.

This plan for reaching the Pole is not only new, but also better than those on which the various expeditions by the way of Smith Sound were based. My personal wishes and views as to the Polar question in general I have already laid down in a previous article. I did this in the presumption that the efforts to reach the Pole would still continue despite all the objections that have been raised against their utility. For this reason, and because it is better that something should be done than nothing, every one will hail with great interest this American project, not so much from a hope of thereby reaching the goal, but from the probability of making new and valuable discoveries in a direction in which the United States have already won distinction. The following are the principal objections against Captain Howgate's plan:

In the first place, it may reasonably be objected to the plan of establishing a Polar colony for three years that such a venture would really be only a three years' Polar expedition without a ship—a North Pole expedition which discards a ship from latitude 82° north because it is useless to have one. But the advantages expected could only be reaped by changing, or rather renewing, the colonists and provisions every three—or what would be still better—every two years. To expect that within three years a condition of the ice will be presented so favorable as to render it possible for a division of the colony to reach the Pole, seems far too sanguine a hope; but by multiplying the projected duration of the colony, there might be a chance of reaching this end, and it would be unnecessary to support the colony every year by sending a ship; in fact, only steamers, and these, only under exceptionably favorable conditions, could succeed in reaching the colony.

Both men and officers could calculate to remain two years

in the colony, as disappointed hopes and impaired health would render their efforts for the third year entirely fruitless. The colonists would be in every respect castaways, and their position would be even worse than that of the men stationed on the summit of Pike's Peak, Mount Washington, or at Fort York. Not much aid could be expected from the coal beds found by the *Discovery*. We found some coal deposits on the second German North Pole expedition in Greenland, but very few lumps of coal could be obtained without blasting.

According to Captain Howgate, the colony should only contain such men as would be capable of making scientific observations. The officers should undoubtedly be able to carry out all scientific labors, but I should be disinclined to engage for the work men not possessing the qualities which I mention further below (in discussing the question of equipment,) while the attainment of the North Pole remains the principal object of the expedition. I will now speak of the equipment of the expedition.

A SEAMAN FOR COMMANDER.

Perfect harmony in the conduct or direction of the expedition is the very first necessity. In modern times the direction of Polar expeditions has been transferred to scholars like Kane, Hayes, Nordenskjöld, Torell, &c. This course is permissible when the main objects of an expedition of small duration are discoveries in the domain of natural history, but not when the *rôle* of the seaman is an important one. Hence, the American expedition should be placed under the command of a seaman.

SELECTION OF THE CREW.

Next to the commander, the selection of the crew requires the greatest solicitude. It should be selected a considerable time before the starting of the expedition, so as to give the incompetent members an opportunity of making place for those that are peculiarly fitted for the task. It is this process of selection, and not its nationality, which decides the value of the crew. It is true that excellent seamanship is not equally distributed among all nations, but it would, nevertheless, require only sufficient time and proper care to procure in almost any country a model crew. It is often assumed that ability to endure cold must be the crucial test of fitness. This as an error. A sense of duty, endur-

ance and determination are the most essential qualities. Habit soon overcomes cold. It often makes heroes out of sybarites by the stern necessity of its endurance. Complete devotion to the object and to the commander presupposes qualities which cannot often be judged in advance, and cannot either be purchased or sufficiently rewarded.. The members of an expedition should only be volunteers, but not as was the case in the Russian expeditions, when the officers were "chosen" as volunteers, although they had declined to participate.

INTELLIGENCE AN IMPORTANT ELEMENT.

A certain degree of intelligence in the crew is of high importance. In many instances they must have certain powers of observation and reflection, and even a certain amount of knowledge, to meet danger and reach certain results. But men who pass in a sledge from old to new ice without noticing it, who pay no attention for several hours to a frozen foot, who do not know how to handle their gun, who do not observe the formation of the country through which they are journeying—such men display an indifference which, be they even as brave as Achilles, may jeopardize the whole expedition. How great the indolence of the uneducated can be, may be inferred from Franklin's retreat. His Canadians purposely threw away or destroyed the most indispensable objects, such as canoes, nets, &c., to save themselves the trouble of carrying them. It was impossible to make them deal economically with the scant provisions. They resisted the orders of their commander, distrusted his directions as to places and routes, secretly wasted their ammunition, the one stole the other's food, and the only thing in which there was unanimity was the defiance of regulations made for the good of all. The American Polar colony would be in a position scarcely less exposed than that of Franklin and his comrades during their retreat. Seamen are better capable of maintaining discipline under such circumstances than members of any other profession, and, therefore, the colony should mostly consist of them.

HOW TO MAINTAIN DISCIPLINE.

The intelligent crew, by reason of its greater independence, is one more difficult to lead than the ignorant. Devotion and blind confidence are rare among intelligent men, and to control them you must set them constantly a good

example, and act upon them by kindness and imperturable calmness. The first law of a Polar expedition is obedience (the history of Polar expeditions narrates the revolts of the crews commanded by Davis, Barentz, Weymouth, Hudson, Hall, T. Ross and many others,) and its foundation is morality. Punishments are either impracticable, or, at all events, unreliable and irritating means of obtaining order. Their use, more especially in a private expedition, will sooner effect dissolution than discipline. Coercion and threats remain without results. It was thus fruitless to secure the success of an expedition by compelling the men who had just failed and returned to again resume their errand, a course adopted in the last century after every baffled effort to reach the goal from the Siberian Polar Sea, when many a distinguished discoverer was, after his return, degraded to a sailor. The best way of inciting meritorious emulation is to promise great rewards to the most deserving after the return home, but this should be done without naming the prospective recipients of such honors during the pendency of the expedition. As to punitive deductions of pay, the men seldom pay any attention to such threats, and with reason, because they are seldom enforced upon the return home.

PECUNIARY INCENTIVES NEEDED.

For the officers the scientific achievements will be sufficient recompense for their labors, but for the crew only material advantages can constitute their satisfactory reward. To be sure, money is but a weak incentive to men who are destined to remain for years among the icy deserts of the North, but it is, after all, the only means by which those indifferent to ideal objects can be interested in their attainment. The crew commanded by Captain T. Ross received for four years of martyrdom, spent on the ice, only £100 each. The sailors of the second German expedition received from eight to twelve thalers per month, but the crew of the *Tegethoff* were much better paid, and some of the sledge travelers received as much as 3,000 florins ($1,500.) A powerful motor for herculean efforts may be obtained by grading the amount of pay according to the success attained. In 1874 I guaranteed to the men who accompanied me in sledges and should reach eighty-one degrees, $500, to those penetrating to eighty-two degrees, $1,250, and to those reaching the eighty-third, $2,500, but in distributing these amounts among them merit was to be a decisive factor. Prudence,

as well as justice, requires that the most deserving men should be protected from want after their return for the remainder of their lives. The crew of the *Tegethoff* all received permanent situations through the State; the crews of the *Alert* and *Discovery* got high premiums, and all the officers were promoted.

I have dwelt somewhat extendedly upon the question of rewards, because individual experience teaches me their importance, and because I presume that the new American expedition will call forth the highest efforts and the most genuine devotion on the part of its members.

WORTHLESS VOLUNTEERS.

Volunteers without special fitness or knowledge available during a Polar expedition—*i. e.*, volunteers who can offer nothing but their so-called enthusiasm—are worthless, and, if they belong to the better classes, they are finally found to be merely in the way.

Contrary to the general opinion, I would not recommend the employment of men who have already taken part in expeditions, except, perhaps, the most deserving among those specially fitted for the work. Others are but too liable to deem their own experience as valuable as those of the commander, and if their views conflict, to oppose a passive resistance, which destroys the first element of successful obedience. On the other hand, men who enter upon their first expedition are apt to receive the directions of an experienced leader with an attention which is generally only paid to revelations. Married men are to be excluded—a course adopted by Barentz (1596) upon his second expedition, while the *Tegethoff* had five on board.

The crew should consist of practiced pedestrians, mountain climbers and workmen. They should all belong to one nationality, and be strong and healthy. The slightest indications of a tendency to rheumatism or affection of the eye and ear or certain other chronic ailments to which sailors fall but too readily a prey render them unable to bear the hardships of a Polar climate, and more especially of a sledge journey. They are like drunkards in this, that they are exceedingly liable to scurvy. Men under thirty are preferable to those above that age.

A PHYSICIAN, PHOTOGRAPER AND PAINTER NEEDED.

The physician of an expedition should possess, besides his

technical capacity, the most unconquerable patience, for to many of the sick he is as much a physician of the mind as of the body. Even if another doctor has already passed upon the physical fitness of the men, he should still subject them to a rigorous examination, for he alone is finally held responsible for diseases which may subsequently break out.

As an expedition should not only aim at its scientific object, but also at the dissemination of a correct idea or the aspects of Polar nature, it is urgently to be recommended that a photographer, and, still better, a painter also, accompany the expedition. A photographer is unfortunately circumscribed in the limits of his usefulness by the immediate surroundings of his ship. A good painter, however, could give us from the interior of the colony house invaluable studies of nature, and particularly of Polar light effects. They would be invaluable because none exist. On exceptionally fine summer days such studies could even be made in the open air, provided that oil and not water colors were used.

THOROUGH EQUIPMENT PREREQUISITE.

In the equipment of the colony in general the principle of providing the temporarily banished with the utmost possible comfort should prevail, as in all other Polar expeditions, even if subsequent experiences should baffle the efforts made in that direction. Ever since reading Kane's work, which I received as a school-boy's prize, I have cherished the greatest admiration for that heroic man, as well as for Hayes, whose incomparable sledge journey has been always present to my mind as a lofty ideal. Experience, however, has taught me to warn other expeditions from starting with such insufficient preparations, and this note of warning applies especially to America, where enthusiasm and love of sacrifice go hand in hand. An expedition which lacks the most essential modern aid, that of steam power, and which (like that of Kane) has only scant provisions during the first winter and has to live on dried applies the second, takes place under conditions even worse than the winter sojourns of Barentz and Hudson. The smallness of the ships in the instances above referred to was partly the cause of the insufficient equipment. Small ships facilitate the passage through the ice, but, deducting the space required for the accommodation of those on board, for the machines and coal, such ships cannot hold supplies and provisions for more than two years and a half. The American

colony, however, is to be equipped for three years; a portable house is to be erected, and twice the usual number of ship's crew is to be taken out. The only alternative, therefore, would be to select a ship of about the size of the *Discovery*.

HOW TO FIT UP THE COLONY'S HOUSE.

Among all circumstances, it is preferable that the members of the expeditions shall remain on board the ship instead of staying in such a house. The ship is warmer and there is less accumulation of ice around it. But as a house is to be erected and used, it should be fitted up for the special use of such an expedition in order to overcome the disadvantages I have named. Of course, the house should be made as dense as a ship, and the living rooms should be provided with water tight tapestry (vulcanized India rubber carpet and hangings.) The house should also be protected outside by a layer of snow several inches thick, and the windows should be covered up. To heat the rooms with ordinary stoves is not advisable, owing to their unequal distribution of the heat, and this can only be secured by the feeding stoves, (Fullofen,) which possess the additional advantage of consuming less coal. The stovepipes should not lead straight up, so that the heat does not escape too soon, but they should be distributed through the room. Hot air, conducted through pipes, is still more preferable, because it counteracts the formation of ice. Bricks will be found useful in some parts of the building. A separate chamber can be covered over with tin, and then used for washing, drying and bathing. The use of a bath in these northern regions is highly advantageous to health, because the skin receives no other friction. Petroleum will light the living rooms sufficiently, but in the cabins stearine candles are preferable to petroleum or train oil. Of great importance is the construction of lamps,(*i. e.*, observation lamps,) which should be used in the winter in the open air, and are not so likely to be extinguished by the blasts of the wind or to be frozen up. Even petroleum freezes at 20 degrees R. Massive grated circular glass lamps, of self-warming capacity, are best fitted for personal use in the open air. They are so popular that it is good to have quite a number. All doors should have latch-hooks and pull-weights.

SOME USEFUL HINTS IN MINOR MATTERS.

An important question in passing a winter in the Arctic

regions is to maintain pure air and an equable heat. The first named requisite is secured by boring a few holes underneath (at the door) for the ingress, and above (at the ceiling) for the exit of the air, and covering them over with condensing vessels. The colony should also not omit to partially surround the house with outbuildings of stone or snow, which can be used for storehouses or windless passages and ante-courts, and these latter could be roofed over with strong canvas.

Discipline requires that the officers and crew should live separately. To transfer the kitchen, also, to the crew's room, with a hope of saving coal thereby, is not advisable, because it would too greatly increase the accumulation of moisture. As long as the men remain in the house they will not require furs, even in the greatest cold. Close fitting woolen underwear and stout clothing will suffice in most cases, although the temperature in the interior of a house is lower than it is on shipboard. To take fur-lined leather boots is not advisable. They are of great weight, become stiff and soon lose their utility by freezing and by the wearing out of the fur. Boots made of seal or reindeer skin are preferable, but the latter should not be exposed to wet and ought to be covered with a cloth.

HOW TO SUPPLY THE COLONY.

The colony will have to suffer more from wet than even expeditions do on shipboard. The changing temperature and condensation of the water steam will exert a disturbing influence upon the instruments. Thick ice films will settle upon them as soon as the observer brings them into the living rooms from the open air, and then they should not be touched, but allowed to evaporate their steam. All instruments taken along by the colony should be cleaned by an optician without oil, so that they shall not freeze, and the gunmaker should do the same with the guns, whose barrels should be dark colored, so that they be less liable to rust. Ammunition, powder fuses for blasting the ice, as well as alcohol and petroleum, require tight vessels, and the last named two liquors should only be accessible through pumps that can be kept well closed. As for the rest, the largest supply of saws, ice augurs, shovels, ice creepers, handles, poles, leather boots, leather, water-tight linen, strong cloth, buffalo hides, flannel, &c., should be taken out. As to solid food, two pounds per man will be enough

for the colony, but on sledge journeys two pounds and three-quarters will be required. This allowance should include one pound of bread and one pound of preserved meat. Besides the usual other supplies, (in which salt meat should be avoided as much as possible,) great quantities of preserved vegetable, cocoa, meat extract, rice, pea sausage and dried farinaceous food (maccaroni, nudels, &c.,) are highly advisable. Fresh bread twice a week, instead of the hard biscuit, is very conducive to health. Indispensable are plenty of tea and tobacco, and the latter, more especially, is sadly missed by seamen. Instances have occurred when the crew would smoke boiled and redried tea, lunt, agaric, moss, and even paper, as they did on the Austrian expedition. Moderate use of spirituous drinks is to be recommended; their influence on health and good fellowship is great. It is very difficult, however, to keep any sufficient quantity of wine, more especially in winter, as all sorts of wine freeze at five to eight degrees R. Even on shipboard the preservation of wine is very difficult, and it will be still more so in the colony. It will be better, therefore, to take but little wine, but all the more good strong rum. The wine (often the best medicine for the sick in these regions) and other indispensable liquids can only be kept in the heated rooms under the tables, near the stove, or under the berths. To prepare chemical wine during the expedition could be but a dreary makeshift. Even the beer which the English expedition brewed on shipboard from malt and hops would be found better. In the colony's home the brewing will require exceedingly slight development of steam, and during extreme cold it will be found impossible to produce fermentation.

A CHAPTER ON HEALTH.

The most careful solicitude should be bestowed upon the selection of preventives of scorbutic diseases. A ration of lime juice should be issued daily, and all anti-scorbutic kinds of food should be provided in abundant quantities. In itself the Arctic air is not unhealthy; on the contrary, catarrh of every description grows less and less, and even the exposures to cold, such as are caused by the frigid temperature and the sudden changes of the temperature, pass by without danger. Whether this favorable condition is owing to a change in the ozone contents of the air remains to be seen. But, even without the climate, there will be many disturbing influences, many privations, labors, moisture; perhaps, also, the depress-

ing effect of disappointments, and sometimes even insufficient opportunity for physical exercise. Polar expeditions are not so dangerous or so frequently fatal as those in the tropics, but infinitely more arduous. The vital powers, however, are lessened year by year by the obstructions to the formation of blood through the unfavorable conditions of life, by the more or less unwholesome, because water tight, clothes, which repress perspiration, by the lack of fresh animal and vegetable food, the want of light and warmth, &c. This diminution of the vital forces will require the renewal of the crew in not more than three years.

HOW TO COMBAT SCURVY.

In spite of all care, however, in equipping the expedition—and a small library should be included for mental occupation—I do not doubt that it will be afflicted with scurvy. Apart from sufferings produced by severe cold, the Polar traveler is not exposed to any form of disease as much as he is to scurvy, and its appearance has the most dismal effect. When it spreads to any extent the usefulness of the expedition is ended. Parry took the moisture in the bedding as the principal cause of scurvy, and while on Melville Island he used sorrel against it with great advantage. He considered beer as the greatest anti-scorbutic of all drinks. During T. Ross' second expedition it became manifest that vegetable food, more especially flour, was of no avail in battling against scurvy. The consumption of fish, seal and train oil will, however, be found of some benefit. Probably without reason it has been assumed that chewing tobacco has an anti-scorbutic tendency in seamen, while the insufficient supply of water, the excessive consumption of salt or pickled meats, the uncleanliness, the long and severe cold and the sensitiveness to it have been deemed favorable to its development. Excepting the tropics, the experience has been that scurvy appears most generally in the winter and spring, and it is, doubtless, encouraged by poor living. Nevertheless, even abundant animal and vegetable food form no perfect preventive of scurvy.

In the absence of fresh vegetable food and of seals the colony will be compelled to hunt land animals. Lime juice, raw potatoes, sour fruit, (not mineral acid,) fresh vegetables, wine, beer lees, exercise in the open air and cheerfulness, important as they all are in preventing scurvy, do not, after

all, take the place of fresh meat in the Arctic regions. I even remember cases of men who neglected all these precautions, and yet, by eating plenty of fresh meat, saved themselves from scurvy. As to lime juice, it is an excellent preventive, but when the disease has once broken out, is of little curative value. Temperature is of great importance. During wet and chilly weather the patient will grow worse, but in dry weather he will improve. In scorbutic affections of the mouth it is advisable to take off the excresences with scissors and to pencil them over with muriatic acid. As an additional preventive of scurvy I should recommend that the crew sleep in swinging hammocks instead of berths, thus escaping the danger of moist bedding. The patients on board the *Tegethoff* recovered at once as soon as they were transferred to a dry cabin, while the occupants of damp cabins suffered more or less from scurvy all the time.

ABOUT SLEDGES AND THEIR CONSTRUCTION.

As it is the task of the colony to reach the Pole by means of boats and sledges, I will give herewith my experiences in regard to their use.

To accomplish the journey to the Pole with sledges alone would require a coast along whose solid ice they could proceed, and which would terminate in a meridional direction. As there is no mainland north of Grant Land, the boat and not the sledge must be the leading factor of the American enterprise. The sledges can only serve to bring boats and provisions over the obstructive ice barriers. The success of the expedition, however, depends entirely on the frequency with which such passages must be effected, and with which the boats can be sailed or rowed.

As to the construction of the sledges I would suggest the following: The runners should be eleven feet long, two and three-quarter inches wide, one and a half feet high, and capable of supporting at least 2,000 pounds. They should be made of ash, shod with steel and terminated at both ends in soft curves. The ends should be high so as to be visible above deep snow. At the back there is a contrivance for steering and pushing the sledge, and this cannot be constructed too solidly. The cooking machine should be made of one piece, and no soldering is permissible, as it should be capable of developing the intensest heat and prevent its escape, and, of course, as little alcohol as possible should be burned. For holding

the alcohol little kegs of twenty quarts will be best. As the journey to the Pole can only be undertaken in the summer, no tents or sleeping sack (schlaisack) is necessary, but it will be sufficient to cover the boats at night in tent fashion. Double-barrelled Lefancheur guns for bullets and small shot and copper cartridges should form the armament. Biscuit should be transported in bags, the other supplies in tin boxes.

ABOUT BOATS AND THEIR EQUIPMENT.

The boats should be made neither of tin, metal, nor leather, India rubber or water tight linen, but of wood. They should be large enough to contain the whole crew, with the sledges placed across them. The boats used by the Norwegians in the Arctic sea ("Fangboote") are well available, except that their hold is too small. They acccommodate seven or eight men, but on account of their sharp keel they can only be drawn with difficulty over the deep snow without sledges. It is, however, impracticable to draw boats for any considerable distances over the ice without sledges. To use runners for the transportation of the boats is not advisable, because they are soon worn out. The boats should be about about 20 feet long, 5½ feet wide, and 2½ feet high. The mast yard should be made of bamboo cane. Seven men would, according to the experience of the *Tegethoff* expedition, require the following supplies, apart from the results of probable hunting, for three months: Pemican, 245 pounds; pea sausage, 400 pounds; boiled beef, 400 pounds; flour, 100 pounds; bread, 250 pounds; chocolate, 90 pounds; salt, 15 pounds; meat entrail 10 pounds; tea, 4 pounds. To this should be added 240 pounds of alcohol, giving a total, without the boats and their inventory, of 1,800 pounds. The personal equipment of the travelers should consist of two woolen shirts, one woolen pair of drawers, three pairs of woolen stockings, leather water boots and caps, and a light fur coat to sleep in.

DOGS AND MEN.

Newfoundland dogs of extraordinary strength would be very useful in passing over the ice cakes, but in the boats they would be in the way. Although Esquimaux would be quite available in the colony, their appetite on the way north is enough to forbid their employment. As the expedition to the North Pole has only a chance of success if the sledges

are used as little as possible, and the boats find nearly constant free passage, it is self-evident that their crews should consist almost entirely of seamen of unusual physical strength.

As to the number of the boats, at least two or three should start on the journey to the Pole. From fourteen to twenty-one men are capable of separating with poles the obstructing ice barriers, (thus saving time in the passage,) to lift heavy boats and place them upon the sledges, &c. A smaller number would be nearly helpless in the face of the innumerable difficulties that are sure to present themselves.

In conclusion, a few remarks as to the chances of reaching the Pole from Grant Land. To accomplish in one summer 800 or 900 miles in an air line to the Pole and back in the Arctic Sea in boats—sledges being only useful in passing over obstructions—the expedition must find a pretty uninterrupted series of open water channels. If they find land they can easily penetrate along the coast to its highest northern point while the wind is favorable. Where there is no land the advance will depend upon the most favorable conditions of the ice, unless the expedition should be unfortunate enough to share the experience of the *Austrian* on its retreat, which accomplished only two German miles in two months. The most favorable moment for beginning the journey could easily be signalized by an advance post in the winter quarters of the *Alert*, but it will not be so easy to seize it, because by the time the expedition had reached the northeasterly corner of Grant Land it may have already passed by. The ice being still dense and intact in June, and still reaching far south, it is useless to attempt to force a passage where the breaking up of the pack into the floating ice some four or six weeks later secures at least a partially open water channel. Hence, the start should not be made before July, and even under the most auspicious circumstances no open passage of any extent will be met in Lincoln Sea before the end of that month. August affords really the best time for the journey, and at its end the retreat should begin, otherwise the expedition may become a prey of the new ice. For ships these channels will be impassable, but boats may force themselves through. The boats, again, lack the force of pressure and afford a smaller visual ken for a selection of the route. The only alternative is to pursue that direction in which the water reflection of the sky points. As to the distance which the expedition will accomplish per

day, it may not be over a few hundred paces under unfavorable circumstances—*i. e.*, with frequent passages over the ice cakes—but under more favorable conditions and tolerably open channels it may reach from twenty to thirty nautical miles. In every respect the passage through Lincoln Sea will closely resemble the retreat of the Austro-Hungarian expedition from Francis Joseph's Land. It is to be ardently hoped that it may be attended with equal good fortune.

JULIUS PAYER.

[Views of Dr. John Rae.]

The following letter is from Dr. John Rae, of London, the Arctic explorer and discoverer of the fate of Sir John Franklin, to the President of the American Geographical Society, on the late English Arctic expedition:

"I am delighted to see by the papers that there is a probability of the United States Government prosecuting Arctic research *via* Smith Sound, a line of route specially American, and made famous by the explorations of Kane, Hayes, and Hall, who, with their comparatively ill equipped and small expeditions, did such noble work, the latter, indeed, having taken his vessel, the *Polaris*, within a few miles of as far north as the point reached by the English ship *Alert* in the expedition of 1875–'76, which, notwithstanding all its bolstering up by some able writers, was a failure, if we compare the work done with the programme laid down for its accomplishment.

Having had some experience in sledging on several very long journeys on the Arctic coast, at an average daily rate of from eighteen to twenty-four miles, and a great deal of practice in snow shoe walking during a twenty years' residence in the Hudson Bay Company's territories, perhaps you will permit me to offer a few remarks upon those points where I think the English expedition made mistakes which, although apparently slight individually, amount to a good deal in the aggregate.

ERRORS OF DIET.

In the first place, the men employed on the Nares expedition were, with few exceptions, habituated to a daily ration of grog at or near midday, this ration having been doubled

for five months of winter, while the men had comparatively little work, except merely walking up and down for a few hours and hauling ice for water, which was not sufficient to keep their muscles in proper condition for the laborious work of sledge hauling. They had a regular allowance of lime juice on board ship, which was doubled in quantity for some time before the sledge traveling began; when it was discontinued altogether. Their diet was suddenly changed from the ship allowance of preserved meat, corned beef, and pork, with six ounces of preserved vegetables, pickles, and fruit, and one ounce lime juice, with one gill rum, to a sledging ration of pemmican, cured bacon, two ounces preserved potatoes, one-half gill rum, and no lime juice.

OBJECTIONABLE SLEDGES.

The sledges, with runners about eight inches high and three inches broad, used by the recent expedition, were very objectionable, as they sank deep in snow when not very hard packed, and when descending from a hummock of ice the fore part dives deep into the snow below, giving immense labor to pull and lift it out—labor which the men say was like tearing their arms off. The best sledge is one resembling the Indian toboggan, but much larger, so as to carry 800, 1,200, or 1,600 pounds, if required, with three runners, rounded at the edges, not more than two and a-half or three inches broad and about three-quarters of an inch deep. I consider the best size is a sledge to hold about 800 pounds, or a load for four men; because if very difficult ice is to be got over these are much more easily handled, and do not require to be unloaded so often, if at all.

CHOCOLATE AND COCOA BAD THINGS.

The English took chocolate or cocoa for breakfast, a very bad thing, tea being much better, as it keeps away thirst. They stopped about an hour and a-half in the middle of each day's journey to make tea, a mistake which should be avoided, as the men must get chilled very much after perspiring freely. I and my men never stopped longer than three or five minutes at a time, particularly if the weather was cold, during the whole ten or more hours we were traveling, only eating occasionally a mouthful of pemmican or bit of fat. If, however, this plan, which I have always found best, does not suit those who are accustomed to dine about midday, use extract of tea, by which at least one-half the time of

stoppage may be saved, because the water need not be boiled, but merely brought to a sufficient heat to be pleasant to drink.

The English sledgemen used for bedding not only a heavy coverlid but a duffle bag for each man, and they also put on a thick duffle "jamper" before going to bed; thus the arms were separated from the body by two folds of a thick non-conductor, and each man was kept apart from his neighbor by four folds of this material, so that heat could not be communicated from one to the other. In my own case we had one covering for all five, with a strip of thin hairy deer skin between us and the snow on which we lay. We took off our coats, placing them either over or under us, according to taste, then lay as close as we could comfortably pack, I always being one of the outsiders, the cook for the time being the other. If one of the "outsiders" felt a little cold the whole party put "about ship," as a sailor would say—that is, turned over on the other side—and thus the part of the body that was previously cold got the warm berth. I may say that I never was uncomfortably cold but once, and that was when the snow house was made too small and we had to shove our legs outside. Our whole bedding for five persons weighed between twenty-four and twenty-five pounds, or less than five pounds each.

SNOW HUTS THE BEST SHELTER.

Tents were used on the recent expedition, and are the worst kind of shelter for Arctic service, being not only very cold, but having this disadvantage, that nearly all the condensed breath and vapor from the hot food adheres to them, not only making the tent heavy and unpleasant to handle, but the least shake makes this condensed vapor fall down upon the bedding, into which, if great care is not used, it gets impacted and aids materially in making it of that "sheet iron" consistence spoken of by Captain Markham at the meeting of our Geographical Society. Snow huts are the best shelter in any temperature from 10° below the freezing point to 70° degrees below zero; and if these cannot be built, either from men not knowing how to do so, or because the snow is not sufficiently packed, snow walls should be run up, which is not hard work if properly set about. These walls may be of any thickness most convenient, and should slope inwards as much as possible—should be five or six feet high—that is, counting the depth of space hollowed

out by removal of snow for the walls. A piece of sheeting has generally been used as a roof. I should prefer a double fold of thin, but strong, linen, having between the folds a thin layer of birds' down, which would make this kind of shelter nearly as warm as a true snow hut, which I and my men never failed in building.

SNOW SHOES.

Snow shoes should also be taken on every Arctic expedition, and would have been of great use in the recent one, although the officers are not willing to allow as much; at least Sir George Nares has said that heavily loaded sledges cannot be hauled by men with snow shoes on. In fact, the gallant knight knows nothing about it, probably never having in his life seen a sledge so hauled, yet he gives his opinion with as much confidence as if he had great experience. The snow shoe best adapted for Arctic work should be short, and broad in proportion. There should be different sizes to suit the different weights of men.

Should it be requisite to build boats to be hauled over the ice they should be made much broader, in proportion to their length, than those I have seen.

THE SLEDGE JOURNEY.

As regards the sledge journey poleward, I can only say that it is no wonder little progress was made with the unnecessary heavy loads* that were dragged by men suffering from scurvy, who, in their weakened state, must have found great difficulty in surmounting obstacles which to healthy and experienced men would have been easy.

DESTINATION OF THE ICEBERGS.

There seems at least one weak point in Sir George Nares' statements, to the effect that there is no getting a ship nearer the Pole *via* Smith Sound than the point reached by the *Alert*. As early as the 31st of July, 1876, a strong southwest wind drove the ice pack out to sea to the northeast, and enabled the *Alert* to round Cape Rawson and run ten miles southward through a fairly open channel until stopped by a heavy floe (floeberg) one and a half miles in diameter, which moved off next day northward "with the tide, at the rate of one and a half miles an hour." (See Nature, November 9,

*After the auxiliary sledge returned the loads were more that 400 pounds per man.

1876, folio 43.) The question to be asked is, Where did all this ten or twelve miles of ice and great floeberg go to? As they went northward the immense fields of ice, 100 feet or more thick, to the north must also have been moving in that direction to make room, otherwise we cannot account for so large a space of open water appearing so suddenly. Probably a day or two of southerly wind might, a few weeks later, have driven the immense piles of paleocrystic ice many miles away, and left a clear passage to the north, even for ships. At Repulse Bay, latitude 66° 32′ north, in 1847, the ice did not clear away sufficiently to allow my boats to get along shore until the 12th of August. It is also probable that the great ridges of ice that looked so formidable and were so unsurmountable to scurvy stricken men, with their heavily laden sledges, did not extend very far northward beyond the latitude of 83° 20′ 26″ north reached, or only twenty-five north of the land at Cape Hecla.

NO GROG.

I should recommend that no grog be given as an allowance, either on board ship or on the sledging; that men should be chosen who had not been accustomed to a regular ration daily of grog; that a few men should be taken as hunters, &c., who had been used to snow shoe walking, sledge hauling, setting nets under the ice, &c.; and such men might be got, I think, at Winnepeg among the English half-breeds there, who are as fine fellows as a person could wish for such work as I have named, but probably equally good men may be found in the States among the Western trappers.

EXERCISES FOR THE MEN.

The men should, during winter, whenever practicable, be exercised in show shoe walking, snow hut and snow shelter building; if a lake is near, in setting nets under the ice, or, perhaps, in the sea, if there are signs of fish; also in sledge hauling, to a sufficient extent to accustom the leg muscles to this particular kind of work. For some time before starting on the sledging journeys the men should, in some degree, be made accustomed to the sledging diet, so as to discover if it agreed with them, although they could not be expected to eat it so readily on board ship as when traveling.

THE CLOTHING.

The clothes used by the English expedition were much

too heavy and woolly outside, not keeping out the wind sufficiently. The best coat, in my opinion, is one made of close but not heavy beaverteen, or of thin leather, lined with stout flannel or bath coating, with as much woolen clothing underneath as a man may by winter experience find requisite for comfort. Moccasins made of good moose skins I consider best for spring journeys, with cross pieces sewn on to prevent slipping. In early winter something waterproof is best. Esquimaux boots are not bad.

I could add a good deal more, but think I have said enough for the present. If there happen to be even only one or two of the suggestions I have named thought worthy of adoption, I shall feel myself amply repaid for troubling you with this long and hurriedly written letter, which I send off in its unfinished state so as to catch to-day's mail.

Believe me, truly yours,

JOHN RAE,
Corresponding Member of the
Geographical Society, New York.

PRESIDENT OF THE GEOGRAPHICAL SOCIETY,
New York."

[From Captain J. Wall Wilson, of Dr. Kane's Second Grinnell Expedition.]

Captain H. W. Howgate, Washington, D. C.:

MY DEAR SIR: I have been much impressed with your plan for reaching the North Pole, and think it is the only feasible method yet proposed; with vessels I believe it impossible. Of course, light boats must be taken with the traveling parties, and I would suggest that they be fitted with something like runners for sliding over the ice, and the same will answer as leeboards when under sail. I think rubber or metallic boats will not answer as well as light cedar ones. Rubber is totally unfit, unless very highly vulcanized. Your greatest difficulty will be found in the roughness of the ice (hummock ice), over which you will have to travel, and, therefore, your boats must be of the lightest material for transportation.

I think you will find that tents made of felt instead of canvas much the best; they are lighter, warmer and the dampness not so likely to penetrate. While making long marches in the north you will find it greatly to your advantage to give your men frequent rests, if only for fifteen or

twenty minutes at a time. When men become weary they do not resist the cold as well.

My opinion is, that a good, strong tea is much better than coffee for men traveling in a very cold climate; liquor should only be used medicinally when exposed to the open air, and then only under the direction of an officer. Men should accustom themselves to eating their meat raw while on sledge parties, as they require all the nutriment and heat it possesses.

I certainly think snow huts the best for sleeping purposes when sufficient snow can be found, but it is a fact that the farther we go north the less snow we find, and you may, therefore, seldom find the necessary quantity near at hand.

I venture to call your attention to an important feature in the construction of your winter quarters. They should be provided with an outer or ante-room, the temperature of which should never be more than forty degrees, for the reception of officers and men on their return from sledge parties, and where they should remain at least twenty-four hours before entering the warmer atmosphere of the living apartment. This room would gradually accustom them to the great change of temperature from the outside to that within. In all the northern expeditions men have suffered much from this sudden change, and not unfrequently death has ensued.

Ventilation of the winter quarters is a most important matter. I would advise you to take a supply of ventilating bricks for two or three chimneys. They are made of sand and cement, and cost but little, and give perfect ventilation, as they can be closed or opened, as desired, without admitting the cold air. * * * * *

In the selection of men, I think you will find spare men, or men not weighing over one hundred and sixty pounds, with no superfluous flesh, will stand the cold and exposure much the best. That was our experience, and I think it has been the experience of other expeditions.

I mention these various points that bear upon the health of the men because I feel how important it is that they should be in good condition for spring travel, and how much success depends upon it. * * * If I can be of any use to you in any way, I shall be pleased to serve you, and I beg you will not hesitate to call upon me. Wishing you every success, and with feelings of the deepest interest in your undertaking, I remain, very truly, yours,

J. Wall Wilson.

LETTER OF M. W. DE FONVIELLE, TO THE MEMBERS OF THE CENTRAL COMMITTEE OF THE GEOGRAPHICAL SOCIETY OF FRANCE.

(Translated by Miss Ida Howgate, Washington, D. C., for the Western Review.)

GENTLEMEN: I have the honor of presenting to you three pamphlets, in the name of Captain Howgate, assistant to the Signal officer at the Washington Signal Office; the first contains the plan for the establishment of the Polar colony which this officer intends to establish on the borders of Lady Franklin's Strait, the favorable report which was made on his proposition the 8th of January, 1877, to the United States Congress by Mr. Willis, in the name of the Committee of Naval Affairs; and several letters of approval, particularly those of Mr. Daly, President of the Geographical Society of New York, and of Prof. Elias Loomis, the celebrated meteorologist of Yale College.

The second, entitled "Correspondence and action of the scientific and commercial associations in reference to the establishment of a Polar colony," comprises the assigned approval of several celebrated and competent persons, among whom it is sufficient to mention Mr. John Rae, and Mr. Julius Payer, whose names are intimately connected with the polar regions, where they have acquired an immortal reputation, and Prof. Joseph Henry, the time honored director of the Smithsonian Institution.

The third gives an account of the preliminary expedition, of which the command has been intrusted to Captain Tyson, and all the details which have come to Europe at different times and which needed to be reunited in the same publication. Captain Howgate has added to it a copy of the instructions given to Mr. Sherman, meteorologist of the expedition, and to Mr. Kumlien, naturalist, especially commissioned with the study of the animals, plants and geology, as well of the countries adjacent to the seat of the Polar colony, as of those which will become ports or winter harbors.

Captain Howgate informs me in his last letter that he is occupied in preparing a new pamphlet, in which he will enlarge and complete the plans already stated several times. He will naturally make several important modifications for the purpose of taking into consideration some suggestions which have been addressed to him, and some studies to which he has devoted himself for more than a year. It is these plans, amended and improved, which he will submit to the United States Congress in its present session—

and this formality is perhaps complied with, even at this hour. I beg the society, then, not to consider the documents which are submitted to it as presenting the decisive expression of Captain Howgate's plans.

But, at the same time, I will take the liberty of requesting it not to await the arrival of documents which will not change the essential basis of the expedition, and to express its opinion upon the information that I have at my disposal and which my correspondence with Captain Howgate will permit me, if it is necessary, to complete, at least in different parts.

I cannot help hoping that the favorable opinion expressed by a Society whose influence increases every day, which possesses so many scientific illustrations of all descriptions, and which has always shown such solicitude for the solution of polar questions, will exercise a favorable influence on the decisions of the United States Congress. It would be very consoling to think that if the state of our finances does not yet permit us to get up a French expedition, the country of Jules de Blossville, of Francois Belot and of Gustave Lambert will not remain alien to the great attempt which is going to be accomplished and whose execution has already begun. In fact, the *world* knows that Captain Tyson winters at this moment on the banks of the Cumberland Gulf, at a point whose exact latitude and longitude will be made known at Washington by the first dispatches received on the opening of the ice. It is foreseen that a decision of the Geographical Society would facilitate the vote of Congress. Permit me to respectfully urge it in order that the news may arrive in time to be useful on the other side of the Atlantic.

I will add that the approbation given to Captain Howgate's plan will not prejudice in any way the plan of the polar international expedition proposed by Count Wilczek and Mr. Charles Weyprecht and which would have been, as you know, discussed by the International Meteorological Congress at Rome in September, 1877, if political events had not obliged the convocation to adjourn till the next year.

The colony at Lady Franklin's Bay must be considered as a beginning of the execution of this universal plan and consequently I am not afraid to say that your adherenee to it is obtained. If the American station is found to be placed in a more elevated latitude than the Count Wilczek and Mr.

Weyprecht wish, it is only because the expedition of Captain Nares had the good fortune to discover, before sailing for England, a rich coal mine, the intelligent working of which will enable the rigors of the severest climate to be endured. These natural treasures belonging to the first occupant, we cannot complain that the compatriots of Captain Hall insist that the Stars and Stripes shall float on the shores where we can, so to speak, see the tomb of the great explorer.

The magnetic observations will be carried on in the Polar colony with the same regularity and in the same manner as in the large observatories of America or of England. Perhaps use will be made of recording instruments.

The means which will be placed at his disposal allowing him to do it, Captain Howgate will not neglect a precaution so essential for seizing the precise moment of the disturbances and determining with exactitude the relation connecting the extraordinary movements of the magnetic needle with the apparitions or paroxysms of the aurora borealis, I have not been able to discover, in the long enumeration of precautions recommended by Messrs. Payer and Weyprecht, any precautions that Captain Howgate has omitted in his programme.

The future station of the colony at Lady Franklin's Bay will therefore furnish observations comparable with those that might be collected later in other analogous establishments as to the questions of magnetism, electricity, rain, wind, etc. The only serious difference will consist in the hour of the individual observations, for the chronometers of the colony will be regulated by Washington time, as Captain Howgate attaches a special importance to the readings which correspond to the passage of the sun in the meridian of Washington, and it is known that this moment has been chosen for the universal observations established by American astronomers. But this particular cannot create any serious difficulty, for it may be inferred that Messrs. Payer and Weyprecht will introduce this important observation in the fine programme which they have made out with such remarkable care and ability.

An important change has been stated by Captain Howgate in the programme of the preliminary expedition. Instead of being confined to establishing weathervanes, whose course is always uncertain, and which, moreover, only indicate the movement of the strata near the surface of the

earth, Captain Howgate has given the order to launch in the air small guide balloons whose course will be observed with care and recorded as regularly as the barometer or thermometer measures.

It is to be regretted that notwithstanding all the efforts which have been made in France to extend this method, and the creation of a service of aerial communications by the War Department, it has not been adopted by one of our observatories, where the direction of winds continue to be studied in the most imperfect manner—as if air balloons had not been invented.

I will take the liberty to remark on this point, that small guide balloons, being constructed scientifically, can be carried by the winds to immense distances. The history of balloons furnishes several examples of it, and that of the siege of Paris would suffice to establish victoriously that free air balloons launched from the Cumberland coast or from the Polar colony would have strong chances of reaching even civilized countries, where a few of them could be collected. It is not necessary to enter into long explanations to show that this manner of proceeding may be considered as very superior to the ancient practice of intrusting closed bottles to the waves of the ocean. Yet it is unnecessary to suppose that in the actual state of aerostatic knowledge it would be possible to start from the Polar colony air balloons equipped with the view of reaching the Polar regions. The plan proposed by a captain in the English Navy has no connection with the projects of Captain Howgate.

While proclaiming the necessity of finding some means of utilizing atmospheric communication on the borders of the eternally frozen sea, where the course towards the Pole will always be so uncertain and slow, the cautious American officer has understood well that it is necessary to proceed in a methodical and sure manner in a question so new. He has taken great care not to fall into the traps of those quacks who prepare inevitable shipwrecks in presenting to the public or even to the Government projects of which we hear so often and which bear the imprint of rashness and ignorance.

The founder of the Polar colony would have wished to organize some free and captive balloon ascents on the border of the Polar Sea, in order to profit by favorable aerial currents to advance toward the north and return towards the south, much the same as the French aeronauts have succeeded in doing on the borders of the Mediterranean or of the ocean.

But after having examined the means which the expedition had at its disposal, it has been found that a gasometer of only eight feet in height and eight feet in diameter, could be constructed in the Polar colony, which would be unable, consequently, to render any service in the inflation of air balloons of from two to three thousand metres cubic, the smallest that can be adopted for so difficult a service. Whatever may be the means used and the process employed for preparing pure carbonated hydrogen gas, a magazine of gas of so feeble a capacity would be no help even in our climates. They would not be satisfactory even for traveling ascensions.

What sincere aeronaut would risk preparing his gas in proportion as it should be introduced into the balloon, unless he resigned himself to prepare it by the action of acid on iron in the apparatus for continuous production by Mr. Henry Giffard. But if it were done in this manner, it would be necessary to carry to the Polar regions a full cargo of sulphuric acid and iron.

If we hesitated at this extreme expedient, use could not be made of the air balloon without having resolved another problem not less difficult.

It would be necessary to keep the balloon inflated until the moment when the atmospheric circumstances would permit of trying the ascension with reasonable chances of returning towards the south after having been carried more or less towards the north. During probably a very long time it would remain exposed to winds of extreme violence.

But the necessity of preserving a balloon in such circumstances is precisely the greatest of all difficulties which will have to be surmounted in order to use air balloons in the Polar regions, as it is only too easy to understand.

For the air balloon which could keep up in the air whose envelope would have a stability to resist the most violent wind, could float during the entire summer above the Polar regions, touch the earth in a multitude of different points, and terminate its voyage near a place of safety. Such a programme would cease to be beyond human power, especially if these countries, where modern civilization struggles with such gigantic difficulties, were marked out by numerous scientific colonies which the spirit of progress will not delay to create there.

I believe, then, it is necessary to encourage and assist Captain Howgate in all the researches which have for their object the study of the distribution of aerial currents at the North

Pole, not only with the view of enlarging our meteorological knowledge, but also with the intention of using them in future aeronautic expeditions.

Indeed, the discovery of circumstances exceptionably favorable, such as the existence of regular land and sea breezes would be, might lead to accumulating even in the colony at Lady Franklin's Bay some means of inflation which would not have been thought of at the beginning of so important an enterprise.

While stating with regret that for the moment we cannot do more, it seems to me that we ought to congratulate Captain Howgate for having introduced air balloons, even under the form of simple exploring balloons, in a region where, sooner or later, they will permit us to approach the solution of the most redoubtable mysteries.

I hope, for my part, that by the help of information collected by Captain Howgate, we shall be able at the close of the Universal Exposition to propose to the Government the adoption of a reasonable plan of aerostatic operations, taking as a basis either the Polar colony of Captain Howgate or those whose foundation will have been decided, according to all probability, at this date.

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In response to this eloquent appeal of M. de Fonvielle, the Geographical Society addressed the following communication to Captain Howgate, as evidence of its interest in the subject of Arctic exploration;

GEOGRAPHICAL SOCIETY OF FRANCE,
No. 3 CHRISTINE ST., PARIS, *January* 31, 1878.

Captain H. W. HOWGATE, *U. S. Army*,
Washington, D. C.:

The Geographical Society of Paris watches with the liveliest interest the efforts which have been made in the United States to organize a scientific colony in the Polar regions of the north, and it will commend every resolution of Congress favorable to the project in which you have taken the initiative, and which, thanks to the aid you have already procured from intelligent compatriots, is already in process of execution.

The Society thinks that your idea of establishing a Polar colony cannot fail to produce results eminently useful to

science, and that, while permitting the indicated observations to be made, it will hasten the geographical conquest of the Polar regions.

The Society follows with its most sympathizing wishes Captain Tyson, in the preliminary expedition with which you have charged him, and its good wishes will likewise be yours the day when at the head of the expedition you have profited from the results obtained by the commander of the *Florence* and his brave fellow voyagers.

In thanking you for the active part you have taken in the preparation of this Polar campaign, we pray you, sir, to be pleased to receive the expression of our most distinguished consideration.

C. DE QUATREFAGES,
President of the Central Commission,
Member of Institute.

DE LA RONCIERE-LE-NOURY,
President of the Society,
Vice-Admiral and Senator.

C. MANNOIR,
General Secretary.

CONCLUDING REMARKS.

In the foregoing pages an attempt has been made to present a succinct account of the plan of Arctic exploration which I have had the honor to propose, of the efforts made to secure the facilities for carrying it into execution, and of the encouragement thus far received from Congress and the public, while the papers and correspondence in the appendix which follows show how extended and how earnest is the interest taken in the project by men of science, scientific associations and the leading commercial bodies of the country.

The enterprise is one of national importance and should be conducted in a manner suited to the dignity of a great nation.

The object of any personal enterprise is naturally limited to an attempt to discover the geographical Pole, while the national one, provided for in the bill before Congress, has for its objects, in addition to this geographical work, the discovery of natural laws affecting the interests of commerce and navigation, and those of general science in every department, the clue to which can only be found by patient observation and study within the Polar area.

Our navy has vessels and men who can well be spared from present duties to carry out the provisions of the bill, and volunteers for the enterprise are numerous among the younger officers, who are eager for an opportunity of acquiring distinction. It would seem impolitic for our Government to deprive them of such an opportunity, when it is offered at so trifling a cost.

The entire cost of the proposed expedition, if equally divided among the inhabitants of the United States, would amount to one-eighth ($\frac{1}{8}$) of a cent for each individual, and as this sum is to cover the expenses for three years, the annual cost to each inhabitant would be the insignificant sum of one-twenty-fourth ($\frac{1}{24}$) of a cent. It is difficult to imagine that any serious objection would be made by any individual to the expenditure of this sum annually for the advancement of science, and for the honor of our country.

The measure has been before Congress and the country nearly two years, and has attracted unusual attention and

criticism. The generally favorable nature of this criticism is an evidence of the popular faith in the practicability of the plan now proposed.

The American Geographical Society, the Smithsonian Institution, the National Academy of Science, the members of former Arctic expeditions, and many gentlemen of high distinction in the walks of science have given it their cordial support, while several of the most important cities throughout the country have directed their Representatives in Congress to advocate the passage of the pending bill.

If America would not be outdone by other nations it behooves her to move at once. The English press report Swedish and Dutch expeditions as already organizing. The English themselves, although they have knighted Captain Nares and promoted every commanding officer of that expedition, are by no means satisfied with their failure or partial success, and the government is being urged to send out again the vessels just returned. France is about to organize a new Arctic expedition, and already there comes across the ocean a suggestion from both France and Holland that by mutual agreement a series of synchronous observations should be taken by each expedition at all points of their courses for future comparison and for the advancement of science throughout the world. The colony on Lady Franklin Bay would form a rallying point and center for the different expeditions of various nations, and it would be the objective point of those trying to reach the Pole by way of Behring's Strait and Nova Zembla, of which there are several, while for those going by way of Smith's Sound it would form the natural base of operations. By the adoption of this plan, therefore, the United States would hold the key to the position, a function as glorious as it would be difficult, and one worthy alike of our national greatness and our enterprise as a people. Having once put our hands to the plow, we should not now turn back. Having done so nobly in the past, we cannot afford to idly relinquish all part in the future. Such a course would neither be consistent with our reputation for energy nor creditable to our Government.

It must he borne in mind that out of four purely American expeditions, three were mainly equipped by private enterprise, while the fourth, that of Captain Hall, which the United States equipped at the cost of little more than $50,000, achieved, in fact, more than had hitherto been done

by the same or any other route, and little less than England accomplished later at a cost of $1,000,000.

We need entertain no doubts of the result. Through the dim vista of vanished centuries the oar of colonizing Greek, the sword of conquering Roman have descended to the Anglo-Saxon as his peculiar appanage and possession, while the heart of Asia, the deserts of Africa and the mighty canons of the West bear equal testimony with the ice bound seas that neither peaceful implement nor warlike weapon has been found too heavy for the brawny hand of the youngest scion of the English speaking race.

We ought not to leave unfinished the noble work which has been so gallantly begun. The eyes of our own people, with those of the whole civilized world abroad, have watched the outgoing of the *Florence* with her hardy crew, and we should be false, indeed, alike to our past history and our future fame, if we should pause in the work of Arctic discovery so auspiciously begun. Private means and private enterprise are good and noble things in themselves, and they have placed in the Nation's hands, for her fostering care and rearing, this ward of science, with the hope that the work so fairly commenced will be pushed to an early and glorious issue. This is a national cause and undertaking; one peculiarly American, whose goal lies where the lonely tomb of the heroic Hall, with its kindly English memorial, stands, a solitary sentinel upon the road to glory. Other nations are taking the field; foreign expeditions are in preparation, and shall we content ourselves with taking a preliminary step and then abandoning the race? With the members of the Senate and of the House, rests the decision of this question. The bill which is now before them provides for following up this great enterprise at an insignificant cost compared with the vast harvest to be reaped, not only in the fields of science, but in the interests of navigation, commerce, and national glory.

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